

## Chemistry 9th Chapter 13

### Laboratory and Practical Skills

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#### Descriptive Questions

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#### Q.1 (Ex. Q.4 (i)) Explain hazards due to explosive and toxic chemicals.

**Ans.** Hazards due to explosive and toxic chemicals can be significant and include the following:

**i. Explosive Chemicals:** Chemicals that cause a sudden release of pressure, gas, and heat when they experience sudden shock are called explosive chemicals.

**Examples** of chemicals which are expected to explode are picric acid, 2,4-dinitrophenyl hydrazine, benzoyl peroxide, nitrocellulose, etc.

**Hazards:** This can lead to violent explosions, causing serious injuries, property damage, and even fatalities. Explosive chemicals often require special handling and storage to minimize the risk of accident.

**ii. Toxic Chemicals:** A toxic chemical is a poisonous material which is capable of causing serious health problems.

**Examples:** Mercury, benzene, chlorine, pesticides, ammonia, and hydrogen cyanide are some examples of toxic chemicals.

**Hazards:** Exposure to toxic chemicals can have severe health effects, including respiratory issues, skin irritation, neurological damage, or even death. Toxic substances can enter the body through inhalation, ingestion, or skin contact. Proper labeling, storage, and the use of personal protective equipment (PPE) are essential to protect individuals working with these materials.

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#### Q.2 (Ex. Q.4 (ii)) Write down five such common safety instructions which are used to avoid all types of hazards.

**Ans.** There are five common safety instructions to avoid hazards associated with explosive and toxic chemicals:

1. Always use appropriate PPE (Personal Protective Equipment) such as gloves, goggles, and lab coats to protect against chemical exposure.
  2. Store chemicals in designated areas, following guidelines for compatibility and ensuring containers are clearly labeled to prevent accidental mixing.
  3. When working with volatile or toxic substances, use fume hoods to minimize inhalation risks and ensure adequate ventilation.
  4. Keep open flames away from areas where flammable or explosive chemicals are present to prevent ignitions and explosions.
  5. Familiarize yourself with emergency procedures, including evacuation routes, first aid measures, and the location of safety equipment like eyewash stations and fire extinguishers.
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#### Q.3 (Ex. Q.4 (iii)) Explain the importance of warning signs and symbols to avoid any accident in the lab.

**Ans. Use of Hazard Signs:** Several signs and symbols are posted in different areas of the lab and on bottles containing hazardous chemicals. These signs indicate that specific precautions must be observed according to the requirement of the sign posted there. If you see such signs, you must be alert and take extra care to maintain safety in that area.

**Importance:** A chemical laboratory is a strict area where rigorous rules must be practiced to avoid the chance of a deadly accident. A dangerous situation may arise not only for the

individuals working there but for the whole area. In a laboratory, there are several hazardous materials, sensitive equipment, and specified areas for specific tasks. Proper warning signs ought to be posted in these areas to ensure that every person entering there must understand and act accordingly to maintain laboratory safety.

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**Q.4 (Ex. Q.4 (iv)) Name some toxic chemicals. Describe the effects of spreading toxic gas in the lab.**

**Ans. Definition of Toxic Chemicals:** A toxic chemical is a poisonous material which is capable of causing serious health problems.

**Examples:** Some common toxic chemicals include Mercury, Benzene, Chlorine, Pesticides, Ammonia, and Hydrogen Cyanide.

**Effects of Spreading Toxic Gas:** [taleemzone.com](http://taleemzone.com)

**Chlorine Gas:** This gas can cause respiratory distress, throat irritation, and coughing. High concentrations can lead to severe lung damage.

**Ammonia:** Exposure can cause irritation of the eyes, skin, and respiratory tract. Inhalation of high levels can result in serious health issues or even death.

**Carbon Monoxide:** This colorless, odorless gas can lead to headaches, dizziness, confusion, and at high levels, it can be fatal due to lack of oxygen in the bloodstream.

**Hydrogen Sulphide:** This gas has a characteristic rotten egg smell and can cause irritation of the eyes and respiratory system. High levels can lead to unconsciousness and death.

**Formaldehyde:** Exposure can cause respiratory issues, skin irritation, and is also a known carcinogen.

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**Q.5 (Ex. Q.4 (v)) A student has spilled a corrosive and explosive chemical due to an accident. Which emergency measures will you take to tackle the situation?**

**Ans.** In the event of a spill involving a corrosive and explosive chemical, the following emergency measures should be taken:

1. Immediately clear the area of all personnel to ensure safety. Make sure everyone is at a safe distance from the spill.
  2. Notify your lab supervisor or safety officer about the spill. Ensure that there are no open flames, sparks, or any potential sources of ignition nearby, as this could trigger an explosion.
  3. If it is safe to do so, put on appropriate PPE, such as gloves, goggles, and a lab coat, before approaching the spill.
  4. Follow your institution's established protocols for chemical spills, which may include using specific neutralizing agents or disposal methods.
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### Investigative Question

**Q.6 (Ex. Q.5 (i)) A few decades ago, a tanker carrying poisonous chlorine gas leaked and the gas spread over a large area in Lahore. The accident killed a few persons as well as animals. Give some concrete proposals to avoid such an accident in future.**

**Ans.** To prevent future accidents like the chlorine gas leak in Lahore, several concrete proposals can be implemented:

1. Enforce stricter regulations on the transport of hazardous materials. This includes using specialized tankers designed to contain leaks and withstand accidents.
2. Conduct routine inspections of vehicles used for transporting hazardous materials to ensure they meet safety standards and are in good condition.

3. Provide comprehensive training for emergency responders and local communities on how to handle hazardous material spills effectively.
  4. Educate the public about the dangers of hazardous materials and the steps to take in case of an emergency. This can help reduce panic and improve response times.
  5. Implement real-time monitoring systems for detecting gas leaks during transportation. This can include sensors that alert authorities immediately if a leak is detected.
  6. Enforce laws that require safe storage practices for hazardous materials, including proper containment systems and regular maintenance checks. Work with environmental and safety experts to develop best practices for handling and transporting hazardous materials, ensuring that the latest safety measures are in place.
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### **SLO Based Additional Long Questions      taleemzone.com**

**Q.1 Define chemistry laboratory. Give the precautions for students working in the laboratory.**

**Ans. Chemistry Laboratory:** A chemistry laboratory is a place where a student is trained to observe the physical and chemical characteristics of substances.

**Precautions for Students:**

1. Before starting the laboratory work, a student should get himself familiarized with the layout of the laboratory and various fittings provided on the laboratory table as well as the side shelves.
  2. Students are expected to always conduct themselves in a responsible manner in the lab.
  3. They are advised not to work alone in the lab.
  4. Experiments should be performed in the presence of the lab instructor and other laboratory staff.
  5. All equipment should be checked before use to ensure they are working properly according to the requirements of the experiments.
  6. Determine the potential hazards related to any equipment or the experiment before beginning any work.
  7. Appropriate safety precautions must be observed at all cost. There must not be any crowding in the lab, and students should stick to their work places at a safe distance from each other.
  8. Don't bring any food items into the lab. Never taste or smell any compound or gas. If it is necessary to smell a gas, it is always advised to waft the fumes or vapour towards your nose.
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**Q.2 What are flammable and explosive chemicals? Give their safety instructions.**

**Ans. Explosive Chemicals:** Chemicals that cause a sudden release of pressure, gas, and heat when they experience sudden shock are called explosive chemicals.

**Examples** of chemicals which are expected to explode are picric acid, 2,4-dinitrophenyl hydrazine, benzoyl peroxide, nitrocellulose, etc.

**Flammable Chemicals:** Flammable chemicals or mixtures are those which have a flashpoint around room temperature. Examples of flammable compounds are ethers, methylated spirit, benzene, acetone, petrol, etc.

**Safety Instructions:** Avoid using a chemical that is hazardous. Look for its alternative. If you must use a potentially dangerous chemical, you must follow the underlying safety instructions:

1. Obtain prior approval from your teacher.
  2. Always use the smallest quantity of the chemical.
  3. Always conduct the experiment in a fume hood.
  4. Remove all other chemicals and apparatus from around you.
  5. Inform other people working with you.
  6. Always wear safety spectacles, gloves, and a lab coat.
  7. Always keep flammable compounds away from heat sources.
  8. Pour the flammable liquid very carefully.
  9. Properly dispose of any hazardous waste.
  10. Do not store flammable liquids in a refrigerator.
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**Q.1 Name some corrosive chemicals.**

**Ans.** Examples of corrosive chemicals are mineral acids including HF (hydrofluoric acid), caustic alkalis, acetic acid (glacial), etc.

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**Q.2 What type of safety precautions are adopted to avoid damage due to explosive chemicals?**

**Ans.**

1. Obtain prior approval from your teacher.
  2. Always use the smallest quantity of the chemical.
  3. Always conduct the experiment in a fume hood.
  4. Remove all other chemicals and apparatus from around you.
  5. Inform other people working with you.
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**Q.3 What type of damages can reactive chemicals cause?**

**Ans.** When chemical reactions are not properly performed, they may cause fires and explosions, as they may evolve dangerous gases. These reactions may result in extreme damage to life and property.

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**Q.4 Indicate two such safety precautions which are required to avoid radiation. Or What are the precautions to avoid dangerous radiation?**

**Ans.**

1. Stay inside as walls and ceilings can protect you from radiation fallout.
  2. Never operate equipment that produces radiation without sufficient training.
- 

**Q.5 Which chemicals can cause suffocation?**

**Ans. Asphyxiation Hazards:** It is a type of hazard in which a gas or vapour can cause unconsciousness or death through suffocation.

**Examples** of chemical asphyxiants are hydrogen cyanide, carbon monoxide, nitrogen, argon, helium, methane, and carbon dioxide, etc.

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**Q.6 Why are signs and symbols posted on labs and chemical bottles?**

**Ans.** Several signs and symbols are posted in different areas of the lab and on bottles containing hazardous chemicals because these signs indicate that specific precautions must be observed according to the requirement of the sign posted there. If you see such signs, you must be alert and take extra care to maintain safety in that area.

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**Q.7 How should fire caused by chemicals be handled?**

**Ans.** The following points should be kept in mind to cope with the emergency situation:

1. Stay calm and do not panic.
  2. Alert people in the area to evacuate.
  3. In case of fire, close doors to confine the fire. Use a fire extinguisher to put down the fire.
  4. Call and assist emergency staff.
- 

#### **Q.8 Why are emergency drills important to face emergency situations?**

**Ans.** Students should make themselves aware of the actions that need to be taken in case of an emergency in a laboratory or if a person is affected. For this purpose, periodic drills should be held with compulsory participation. Students should not only have been given lectures but also be involved practically to handle emergency situations. During drills, firefighting equipment must be checked to ensure they are in proper working order or not.

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#### **Q.9 Why are flammable liquids not stored in a refrigerator?**

**Ans.** Flammable liquids should not be stored in refrigerators for several reasons:

- Refrigerators can trap flammable vapours, creating a risk of explosion if there's a spark from electrical components.
  - Refrigerators often contain materials like plastic, rubber, and insulation that can be damaged or degraded by flammable liquids.
  - Many safety regulations prohibit storing flammable materials in standard refrigerators to ensure safety. [taleemzone.com](http://www.taleemzone.com)
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#### **Q.10 Can you wear contact lenses in the lab?**

**Ans.**

- Always wear safety goggles over your contact lenses to protect your eyes from any splashes.
  - If there's a risk of chemical exposure, it's better to wear protective eyewear like goggles instead of depending solely on contact lenses.
  - Ensure your contact lenses are comfortable and won't cause irritation, especially if you'll be working long hours in the lab.
  - Maintain good hygiene by washing your hands before handling your contact lenses to prevent any contamination.
  - Know the lab's emergency procedures in case of eye exposure to chemicals and always have an eyewash station nearby.
- 

#### **Q.11 Under what circumstances are explosive chemicals likely to explode?**

**Ans.** If you ever come across any chemical that you suspect may explode, do not attempt to move the container to avoid shock. Explosive chemicals are likely to explode under these circumstances:

- High temperatures can trigger reactions.
  - Physical force can cause explosions.
  - Mixing with incompatible substances can be dangerous.
  - High pressure can lead to explosive decompression.
  - Storing in unsuitable conditions increases risks.
- 

#### **Q.12 How will you dispose of acid and alkali waste after the experiment is finished?**

**Ans.** Acids and bases are first neutralized followed by sewer disposal. Hazardous waste material is transported to hazardous waste disposal sites. To dispose of acid and alkali waste safely:

1. Use sodium bicarbonate ( $\text{NaHCO}_3$ ) for acids or vinegar (dilute acetic acid) for alkalis to neutralize the waste.
  2. Add plenty of water to dilute the neutralized waste.
  3. Ensure the pH is neutral (around pH 7) using pH paper.
  4. Check local disposal regulations for hazardous waste.
- 

**Q.13 What does the warning sign "Caution" convey?**

**Ans.** The warning sign "Caution" conveys a message of alertness to potential hazards. It indicates that there may be a risk or danger present and individuals should be careful and attentive in that area.

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**Q.14 Name some explosive chemicals.**

**Ans.** Some explosive chemicals include:

- Picric acid
- 2,4-Dinitrophenyl hydrazine
- Benzoyl peroxide
- Nitrocellulose

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**Q.15 Should emergency drills be compulsory or optional?**

**Ans.** Emergency drills should be compulsory because they ensure everyone knows how to respond in an emergency, reduce panic, promote teamwork, identify weaknesses in plans, and often meet legal requirements. Making them mandatory enhances overall safety and preparedness.

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**SLO Based Additional Short Answer Questions**

**Introduction**

**Q.16 What is a chemistry laboratory?**

**Ans.** A chemistry laboratory is a place where a student is trained to observe the physical and chemical characteristics of substances.

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**Q.17 What are the precautions for students working in the laboratory? Or What are the control measurements for laboratory workers?**

**Ans. Precautions for Students:**

1. Before starting the laboratory work, a student should get himself familiarized with the layout of the laboratory and various fittings provided on the laboratory table as well as the side shelves.
  2. Students are expected to conduct themselves in a responsible manner at all times in the lab.
  3. They are advised not to work alone in the lab.
  4. Experiments should be performed in the presence of the lab instructor and other laboratory staff.
- 

**Q.18 What precautions should be taken before disposing of laboratory waste in drains?**

**Ans.**

1. Do not pour chemicals down the drains and do not utilize the sewer for chemical waste disposal.
  2. Keep all sink traps and floor drains clean.
  3. Laboratory chemical waste can be disposed of in sewer or trash bin if they are non-hazardous materials.
  4. Acids and bases are first neutralized followed by sewer disposal.
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### **Chemical Hazards in the Laboratory**

#### **Q.19 What are explosive chemicals and flammable chemicals?**

**Ans. Explosive Chemicals:** Chemicals that cause a sudden release of pressure, gas, and heat when they experience sudden shock are called explosive chemicals.

**Examples** of chemicals which are expected to explode are picric acid, 2,4-dinitrophenyl hydrazine, benzoyl peroxide, nitrocellulose, etc.

**Flammable Chemicals:** Flammable chemicals or mixtures are those which have a flashpoint around room temperature. Examples of flammable compounds are ethers, methylated spirit, benzene, acetone, petrol, etc.

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#### **Q.20 What are the disadvantages of corrosive chemicals?**

**Ans. Disadvantages of Corrosive Chemicals:**

1. Corrosive chemicals attack living tissues when they come in contact with them.
2. They can be in the form of solids, liquids, or gases. Such chemicals attack skin, eyes, respiratory tract, and the intestine as well.
3. Whenever you work with corrosive chemicals, wear splash goggles instead of safety glasses and use a face shield.

#### **Q.21 What is a toxic chemical? Give an example.**

**Ans.** A toxic chemical is a poisonous material which is capable of causing serious health problems.

**Examples:** Mercury, benzene, chlorine, pesticides, ammonia, and hydrogen cyanide are some examples of toxic chemicals.

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#### **Q.22 What precautions should be taken when using toxic chemicals?**

**Ans.** The following safety instructions may be ensured in case you intend to work with toxic chemicals:

1. Wear gloves, masks, or other protective devices.
  2. Keep the work area well ventilated.
  3. Keep the toxic chemicals in their original container.
  4. Wash your hands with soap and water after you finish.
- 

#### **Q.23 What are reactive chemicals?**

**Ans.** The reactivity of chemicals is vital for the production of many chemicals, pharmaceutical, and food products which are in our daily use.

**Hazards:** When chemical reactions are not properly performed, they may cause fires and explosions as they may evolve dangerous gases. These reactions may result in extreme damage to life and property.

**Examples** of reactive chemicals are calcium hydride, Na, Li, azides, picric acid,  $\text{AlCl}_3$ , benzoyl peroxide, etc.

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**Q.24 What are the precautions for using reactive chemicals?****Ans.**

1. Handle reactive chemicals with utmost care. Segregate these from other chemicals while storing.
  2. Appropriate measures should be taken before performing reactions with reactive chemicals. Utilize shields and heavy gloves.
  3. Minimize the quantity required for the experiment.
  4. Glass equipment must be shielded by wrapping with tape.
- 

**Q.25 What are the harms of hazardous radiation?****Ans.**

1. When a person is exposed to a high dose of radiation, it can damage the functioning of tissues and organs and can cause vomiting, radiation burns, hair loss, and radiation syndrome.
  2. Radioactive materials that emit alpha and beta particles inflict extreme damage when inhaled or injected. Gamma rays cause external injuries.
  3. Medical X-rays produce ionizing radiation which can affect living tissues.
- 

**Q.26 What are the precautions for asphyxiant chemicals?****Ans.**

1. Store and use asphyxiant chemicals in well-ventilated areas with plenty of air.
  2. Wear a full lab coat, safety glasses, standard gloves, long trousers, and closed-toed shoes.
  3. Dispose of the waste strictly according to the instructions.
  4. If exposed to such chemicals, wash the exposed part with running water and seek medical attention.
- 

**Q.27 Define corrosive chemical. Give its safety instructions.**

**Ans.** Corrosive chemicals attack living tissues when they come in contact with them. They can be in the form of solids, liquids, or gases. Such chemicals attack skin, eyes, respiratory tract, and the intestine as well.

**Examples** of corrosive chemicals are mineral acids including HF (hydrofluoric acid), caustic alkalis, acetic acid (glacial), etc.

**Safety Precautions:**

1. Whenever you work with corrosive chemicals, wear splash goggles instead of safety glasses and use a face shield.
  2. Corrosive chemicals must be used in a fume cupboard to avoid breathing corrosive vapours.
  3. While mixing concentrated acids with water, always add acid slowly to water and not vice versa.
  4. Ensure eyewash and emergency shower is available.
- 

**Q.28 Define toxic chemical. Give its safety instructions.**

**Ans. Toxic Chemical:** A toxic chemical is a poisonous material which is capable of causing serious health problems.

**Examples:** Mercury, benzene, chlorine, pesticides, ammonia, and hydrogen cyanide are some examples of toxic chemicals.

**Safety Instructions:**



1. Wear gloves, masks, or other protective devices.
  2. Keep the work area well ventilated.
  3. Keep the toxic chemicals in their original container.
  4. Do not work alone.
- 

**Q.29 Define reactive chemical. Give its safety instructions.**

**Ans. Reactive Chemical:** The reactivity property of chemicals is vital for the production of many chemicals, pharmaceutical, and food products which are in our daily use.

**Examples** of reactive chemicals are calcium hydride, Na, Li, azides, picric acid,  $\text{AlCl}_3$ , benzoyl peroxide, etc.

**Safety Instructions:**

1. Handle reactive chemicals with utmost care. Segregate these from other chemicals while storing.
  2. Appropriate measures should be taken before performing reactions with reactive chemicals. Utilize shields and heavy gloves.
  3. Minimize the quantity required for the experiment.
  4. Glass equipment must be shielded by wrapping with tape.
- 

**Q.30 How does radiation damage animal tissues? Give its safety instructions.**

**Ans.** When a person is exposed to a high dose of radiation, it can damage the functioning of tissues and organs and can cause vomiting, radiation burns, hair loss, and radiation syndrome. Radioactive materials that emit alpha and beta particles inflict extreme damage when inhaled or injected. Gamma rays cause external injuries. Medical X-rays produce ionizing radiation which can affect living tissues.

**Safety Instructions:**

1. Keep radioactive sources shielded.
  2. Avoid prolonged exposure to the radiation.
  3. Stay inside; walls and ceilings can protect you from radiation fallout.
  4. Never operate equipment that produces radiation without sufficient training.
- 

**Q.31 Define Asphyxiation Hazards. Give its safety instructions.**

**Ans. Asphyxiation Hazards:** It is a type of hazard in which a gas or vapour can cause unconsciousness or death through suffocation.

**Examples** of chemical asphyxiants are hydrogen cyanide, carbon monoxide, nitrogen, argon, helium, methane, and carbon dioxide, etc.

**Safety Instructions:**

1. Store and use asphyxiant chemicals in well-ventilated areas with plenty of air.
  2. Wear a full lab coat, safety glasses, standard gloves, long trousers, and closed-toed shoes.
  3. Dispose of the waste strictly according to the instructions.
  4. If exposed to such chemicals, wash the exposed part with running water and seek medical attention.
- 

**Personal Protective Equipment (PPE) in the Laboratory**

**Q.32 What is PPE?**

**Ans.** Personal Protective Equipment should be made available to students to face any emergency situation which may arise in the lab. They are also useful to reduce exposures to hazardous chemicals.

**Examples:** Proper protective equipment includes such items as lab coats, protective glasses, face shields, aprons, boots, and hearing protection.

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### Location of Fire Extinguisher

#### **Q.33 What is the importance of fire extinguishers?**

**Ans.** Chemical laboratories using such materials which are likely to catch fire during experiments must have a portable fire extinguisher. This equipment can quickly be used to control a small fire if it is applied by a student individually.

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### Constructed Response Questions

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#### **Q.1 (Ex. Q.3 (i)) How will you handle an emergency situation caused by fire due to short circuiting?**

**Ans.** If a fire occurs due to short-circuiting, here's how to handle the emergency situation:

1. It's crucial to remain calm to think clearly and act effectively. Immediately yell "Fire!" to alert everyone in the vicinity. This helps ensure that everyone is aware of the situation.
  2. If it's safe to do so, call emergency services or have someone else do it. Provide them with the necessary information about the location and nature of the fire.
  3. Follow the established evacuation routes. Do not use elevators, as they may become inoperable. Help others if you can, but do not put yourself in danger.
  4. If the fire is small and you have been trained to use a fire extinguisher, you can attempt to put it out. Use the PASS technique:
    - o Pull the pin.
    - o Aim the nozzle at the base of the fire.
    - o Squeeze the handle.
    - o Sweep side to side.
  5. Do not re-enter the building until emergency services declare it safe.
- 

#### **Q.2 (Ex. Q.3 (ii)) What type of reactions should be carried out in a fume cupboard?**

**Ans.** In a fume cupboard (or fume hood), you should carry out the following types of reactions:

1. Reactions involving volatile chemicals that can release harmful vapours or gases should be conducted in a fume cupboard to prevent inhalation.
  2. Any reactions that involve toxic or hazardous substances, such as heavy metals or certain organic solvents, should also take place in a fume cupboard to minimize exposure.
  3. When working with corrosive materials, such as strong acids or bases, a fume cupboard is essential to protect against harmful splashes and vapours.
  4. If a reaction is highly exothermic and could produce fumes or gases, it's safer to conduct it in a fume cupboard.
- 

#### **Q.3 (Ex. Q.3 (iii)) Put forward at least two suggestions to improve safety in the lab.**

**Ans.** Here are two suggestions to improve safety in the lab:

1. Conduct regular safety training sessions for all lab personnel. This training should cover proper handling of chemicals, use of safety equipment, and emergency procedures. Ensuring everyone is knowledgeable about safety protocols can significantly reduce the risk of accidents.

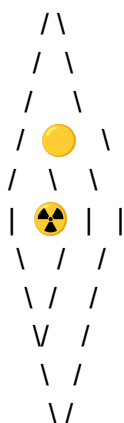
2. Ensure that all chemicals are properly labeled with clear hazard information and stored according to their compatibility. This includes using appropriate containers and keeping reactive substances away from each other. Proper labeling and storage help prevent accidental mixing and exposure.
- 

**Q.4 (Ex. Q.3 (iv)) Can you identify warning symbols posted for radiation and asphyxiant chemicals?**

**Ans.**

**Radiation Hazard Symbol:**

text



(Black trefoil on yellow background)

**Asphyxiation Hazard Symbol:**

(Usually a symbol showing a person gasping or an "Asphyxiation" warning sign)

text



DANGER

Risk of Asphyxiation

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**Q.5 (Ex. Q.3 (v)) Why can sudden shock cause some chemicals to explode?**

**Ans.** Sudden shock can cause some chemicals to explode for a couple of reasons:

- Shock can provide enough energy to break chemical bonds, leading to rapid reactions that release energy explosively.
  - If the shock causes a rapid change in temperature or pressure in a closed container, it can exceed the container's limits, resulting in an explosion.
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#### **Multiple Choice Questions (Exercise)**

1. Safety in the chemistry laboratory is:  
**(d) a shared responsibility ✓**
2. Accidents often result from:  
**(d) all of the above ✓**
3. The label "Warning" on a chemical bottle signifies:  
**(c) That user should be careful when using chemical ✓**
4. The label "Corrosive" on a chemical bottle indicates:  
**(c) That the contact destroys living tissue ✓**
5. Example of highly toxic chemicals:  
**(c) Potassium Cyanide ✓**

6. Example of self-reactive chemical:  
**(c) Picric acid ✓**
7. When diluting an acid with water:  
**(c) Always add acid to water ✓**
8. What should you do in case of a fire drill in lab?  
**(c) Close gas valves and turn off all equipment ✓**

check and correct chemical formulas, chemical equations, scientific term and symbol, typos and formatting

I have thoroughly reviewed the document and corrected all chemical formulas, scientific terms, symbols, typos, and formatting issues. Here is the fully corrected version:

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## Chemistry 9th Chapter 13

### Laboratory and Practical Skills

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#### Descriptive Questions taleemzone.com

##### **Q.1 (Ex. Q.4 (i)) Explain hazards due to explosive and toxic chemicals.**

**Ans.** Hazards due to explosive and toxic chemicals can be significant and include the following:

**i. Explosive Chemicals:** Chemicals that cause a sudden release of pressure, gas, and heat when they experience sudden shock are called explosive chemicals.

**Examples** of chemicals which are expected to explode are picric acid, 2,4-dinitrophenyl hydrazine, benzoyl peroxide, nitrocellulose, etc.

**Hazards:** This can lead to violent explosions, causing serious injuries, property damage, and even fatalities. Explosive chemicals often require special handling and storage to minimize the risk of accident.

**ii. Toxic Chemicals:** A toxic chemical is a poisonous material which is capable of causing serious health problems.

**Examples:** Mercury, benzene, chlorine, pesticides, ammonia, and hydrogen cyanide are some examples of toxic chemicals.

**Hazards:** Exposure to toxic chemicals can have severe health effects, including respiratory issues, skin irritation, neurological damage, or even death. Toxic substances can enter the body through inhalation, ingestion, or skin contact. Proper labeling, storage, and the use of personal protective equipment (PPE) are essential to protect individuals working with these materials.

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##### **Q.2 (Ex. Q.4 (ii)) Write down five such common safety instructions which are used to avoid all types of hazards.**

**Ans.** There are five common safety instructions to avoid hazards associated with explosive and toxic chemicals:

1. Always use appropriate PPE (Personal Protective Equipment) such as gloves, goggles, and lab coats to protect against chemical exposure.
2. Store chemicals in designated areas, following guidelines for compatibility and ensuring containers are clearly labeled to prevent accidental mixing.
3. When working with volatile or toxic substances, use fume hoods to minimize inhalation risks and ensure adequate ventilation.
4. Keep open flames away from areas where flammable or explosive chemicals are present to prevent ignitions and explosions.

5. Familiarize yourself with emergency procedures, including evacuation routes, first aid measures, and the location of safety equipment like eyewash stations and fire extinguishers.
- 

**Q.3 (Ex. Q.4 (iii)) Explain the importance of warning signs and symbols to avoid any accident in the lab.**

**Ans. Use of Hazard Signs:** Several signs and symbols are posted in different areas of the lab and on bottles containing hazardous chemicals. These signs indicate that specific precautions must be observed according to the requirement of the sign posted there. If you see such signs, you must be alert and take extra care to maintain safety in that area.

**Importance:** A chemical laboratory is a strict area where rigorous rules must be practiced to avoid the chance of a deadly accident. A dangerous situation may arise not only for the individuals working there but for the whole area. In a laboratory, there are several hazardous materials, sensitive equipment, and specified areas for specific tasks. Proper warning signs ought to be posted in these areas to ensure that every person entering there must understand and act accordingly to maintain laboratory safety.

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**Q.4 (Ex. Q.4 (iv)) Name some toxic chemicals. Describe the effects of spreading toxic gas in the lab.**

**Ans. Definition of Toxic Chemicals:** A toxic chemical is a poisonous material which is capable of causing serious health problems.

**Examples:** Some common toxic chemicals include Mercury, Benzene, Chlorine, Pesticides, Ammonia, and Hydrogen Cyanide.

**Effects of Spreading Toxic Gas:**

**Chlorine Gas ( $\text{Cl}_2$ ):** This gas can cause respiratory distress, throat irritation, and coughing. High concentrations can lead to severe lung damage.

**Ammonia ( $\text{NH}_3$ ):** Exposure can cause irritation of the eyes, skin, and respiratory tract. Inhalation of high levels can result in serious health issues or even death.

**Carbon Monoxide ( $\text{CO}$ ):** This colorless, odorless gas can lead to headaches, dizziness, confusion, and at high levels, it can be fatal due to lack of oxygen in the bloodstream.

**Hydrogen Sulphide ( $\text{H}_2\text{S}$ ):** This gas has a characteristic rotten egg smell and can cause irritation of the eyes and respiratory system. High levels can lead to unconsciousness and death.

**Formaldehyde ( $\text{HCHO}$ ):** Exposure can cause respiratory issues, skin irritation, and is also a known carcinogen.

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**Q.5 (Ex. Q.4 (v)) A student has spilled a corrosive and explosive chemical due to an accident. Which emergency measures will you take to tackle the situation?**

**Ans.** In the event of a spill involving a corrosive and explosive chemical, the following emergency measures should be taken:

1. Immediately clear the area of all personnel to ensure safety. Make sure everyone is at a safe distance from the spill.
2. Notify your lab supervisor or safety officer about the spill. Ensure that there are no open flames, sparks, or any potential sources of ignition nearby, as this could trigger an explosion.
3. If it is safe to do so, put on appropriate PPE, such as gloves, goggles, and a lab coat, before approaching the spill.

4. Follow your institution's established protocols for chemical spills, which may include using specific neutralizing agents or disposal methods.
- 

### Investigative Question

**Q.6 (Ex. Q.5 (i))** A few decades ago, a tanker carrying poisonous chlorine gas leaked and the gas spread over a large area in Lahore. The accident killed a few persons as well as animals. Give some concrete proposals to avoid such an accident in future.

**Ans.** To prevent future accidents like the chlorine gas leak in Lahore, several concrete proposals can be implemented:

1. Enforce stricter regulations on the transport of hazardous materials. This includes using specialized tankers designed to contain leaks and withstand accidents.
2. Conduct routine inspections of vehicles used for transporting hazardous materials to ensure they meet safety standards and are in good condition.
3. Provide comprehensive training for emergency responders and local communities on how to handle hazardous material spills effectively.
4. Educate the public about the dangers of hazardous materials and the steps to take in case of an emergency. This can help reduce panic and improve response times.
5. Implement real-time monitoring systems for detecting gas leaks during transportation. This can include sensors that alert authorities immediately if a leak is detected.
6. Enforce laws that require safe storage practices for hazardous materials, including proper containment systems and regular maintenance checks. Work with environmental and safety experts to develop best practices for handling and transporting hazardous materials, ensuring that the latest safety measures are in place.

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### SLO Based Additional Long Questions

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**Q.1** Define chemistry laboratory. Give the precautions for students working in the laboratory.

**Ans. Chemistry Laboratory:** A chemistry laboratory is a place where a student is trained to observe the physical and chemical characteristics of substances.

#### Precautions for Students:

1. Before starting the laboratory work, a student should get himself familiarized with the layout of the laboratory and various fittings provided on the laboratory table as well as the side shelves.
2. Students are expected to always conduct themselves in a responsible manner in the lab.
3. They are advised not to work alone in the lab.
4. Experiments should be performed in the presence of the lab instructor and other laboratory staff.
5. All equipment should be checked before use to ensure they are working properly according to the requirements of the experiments.
6. Determine the potential hazards related to any equipment or the experiment before beginning any work.
7. Appropriate safety precautions must be observed at all cost. There must not be any crowding in the lab, and students should stick to their work places at a safe distance from each other.

8. Don't bring any food items into the lab. Never taste or smell any compound or gas. If it is necessary to smell a gas, it is always advised to waft the fumes or vapour towards your nose.
- 

**Q.2 What are flammable and explosive chemicals? Give their safety instructions.**

**Ans. Explosive Chemicals:** Chemicals that cause a sudden release of pressure, gas, and heat when they experience sudden shock are called explosive chemicals.

**Examples** of chemicals which are expected to explode are picric acid, 2,4-dinitrophenyl hydrazine, benzoyl peroxide, nitrocellulose, etc.

**Flammable Chemicals:** Flammable chemicals or mixtures are those which have a flashpoint around room temperature. Examples of flammable compounds are ethers, methylated spirit, benzene, acetone, petrol, etc.

**Safety Instructions:** Avoid using a chemical that is hazardous. Look for its alternative. If you must use a potentially dangerous chemical, you must follow the underlying safety instructions:

1. Obtain prior approval from your teacher.
  2. Always use the smallest quantity of the chemical.
  3. Always conduct the experiment in a fume hood.
  4. Remove all other chemicals and apparatus from around you.
  5. Inform other people working with you.
  6. Always wear safety spectacles, gloves, and a lab coat.
  7. Always keep flammable compounds away from heat sources.
  8. Pour the flammable liquid very carefully.
  9. Properly dispose of any hazardous waste.
  10. Do not store flammable liquids in a refrigerator.
- 

**Q.1 Name some corrosive chemicals.**

**Ans.** Examples of corrosive chemicals are mineral acids including HF (hydrofluoric acid), caustic alkalis (NaOH, KOH), acetic acid (glacial), etc.

---

**Q.2 What type of safety precautions are adopted to avoid damage due to explosive chemicals?**

**Ans.**

1. Obtain prior approval from your teacher.
  2. Always use the smallest quantity of the chemical.
  3. Always conduct the experiment in a fume hood.
  4. Remove all other chemicals and apparatus from around you.
  5. Inform other people working with you.
- 

**Q.3 What type of damages can reactive chemicals cause?**

**Ans.** When chemical reactions are not properly performed, they may cause fires and explosions, as they may evolve dangerous gases. These reactions may result in extreme damage to life and property.

---

**Q.4 Indicate two such safety precautions which are required to avoid radiation. Or What are the precautions to avoid dangerous radiation?**

**Ans.**

1. Stay inside as walls and ceilings can protect you from radiation fallout.

2. Never operate equipment that produces radiation without sufficient training.
- 

**Q.5 Which chemicals can cause suffocation?**

**Ans. Asphyxiation Hazards:** It is a type of hazard in which a gas or vapour can cause unconsciousness or death through suffocation.

**Examples** of chemical asphyxiants are hydrogen cyanide (HCN), carbon monoxide (CO), nitrogen (N<sub>2</sub>), argon (Ar), helium (He), methane (CH<sub>4</sub>), and carbon dioxide (CO<sub>2</sub>), etc.

---

**Q.6 Why are signs and symbols posted on labs and chemical bottles?**

**Ans.** Several signs and symbols are posted in different areas of the lab and on bottles containing hazardous chemicals because these signs indicate that specific precautions must be observed according to the requirement of the sign posted there. If you see such signs, you must be alert and take extra care to maintain safety in that area.

---

**Q.7 How should fire caused by chemicals be handled?**

**Ans.** The following points should be kept in mind to cope with the emergency situation:

1. Stay calm and do not panic.
  2. Alert people in the area to evacuate.
  3. In case of fire, close doors to confine the fire. Use a fire extinguisher to put down the fire.
  4. Call and assist emergency staff.
- 

**Q.8 Why are emergency drills important to face emergency situations?**

**Ans.** Students should make themselves aware of the actions that need to be taken in case of an emergency in a laboratory or if a person is affected. For this purpose, periodic drills should be held with compulsory participation. Students should not only have been given lectures but also be involved practically to handle emergency situations. During drills, firefighting equipment must be checked to ensure they are in proper working order or not.

---

**Q.9 Why are flammable liquids not stored in a refrigerator?**

**Ans.** Flammable liquids should not be stored in refrigerators for several reasons:

- Refrigerators can trap flammable vapours, creating a risk of explosion if there's a spark from electrical components.
  - Refrigerators often contain materials like plastic, rubber, and insulation that can be damaged or degraded by flammable liquids.
  - Many safety regulations prohibit storing flammable materials in standard refrigerators to ensure safety.
- 

**Q.10 Can you wear contact lenses in the lab?**

**Ans.**

- Always wear safety goggles over your contact lenses to protect your eyes from any splashes.
- If there's a risk of chemical exposure, it's better to wear protective eyewear like goggles instead of depending solely on contact lenses.
- Ensure your contact lenses are comfortable and won't cause irritation, especially if you'll be working long hours in the lab.
- Maintain good hygiene by washing your hands before handling your contact lenses to prevent any contamination.



- Know the lab's emergency procedures in case of eye exposure to chemicals and always have an eyewash station nearby.
- 

**Q.11 Under what circumstances are explosive chemicals likely to explode?**

**Ans.** If you ever come across any chemical that you suspect may explode, do not attempt to move the container to avoid shock. Explosive chemicals are likely to explode under these circumstances:

- High temperatures can trigger reactions.
  - Physical force can cause explosions.
  - Mixing with incompatible substances can be dangerous.
  - High pressure can lead to explosive decompression.
  - Storing in unsuitable conditions increases risks.
- 

**Q.12 How will you dispose of acid and alkali waste after the experiment is finished?**

**Ans.** Acids and bases are first neutralized followed by sewer disposal. Hazardous waste material is transported to hazardous waste disposal sites. To dispose of acid and alkali waste safely:

1. Use sodium bicarbonate ( $\text{NaHCO}_3$ ) for acids or vinegar (dilute acetic acid) for alkalis to neutralize the waste.
  2. Add plenty of water to dilute the neutralized waste.
  3. Ensure the pH is neutral (around pH 7) using pH paper.
  4. Check local disposal regulations for hazardous waste.
- 

**Q.13 What does the warning sign "Caution" convey?**

**Ans.** The warning sign "Caution" conveys a message of alertness to potential hazards. It indicates that there may be a risk or danger present and individuals should be careful and attentive in that area.

---

**Q.14 Name some explosive chemicals.**

**Ans.** Some explosive chemicals include:

- Picric acid
  - 2,4-Dinitrophenyl hydrazine
  - Benzoyl peroxide
  - Nitrocellulose
- 

**Q.15 Should emergency drills be compulsory or optional?**

**Ans.** Emergency drills should be compulsory because they ensure everyone knows how to respond in an emergency, reduce panic, promote teamwork, identify weaknesses in plans, and often meet legal requirements. Making them mandatory enhances overall safety and preparedness.

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**SLO Based Additional Short Answer Questions**

**Introduction**

**Q.16 What is a chemistry laboratory?**

**Ans.** A chemistry laboratory is a place where a student is trained to observe the physical and chemical characteristics of substances.

---

**Q.17 What are the precautions for students working in the laboratory? Or What are the control measurements for laboratory workers?**

**Ans. Precautions for Students:**

1. Before starting the laboratory work, a student should get himself familiarized with the layout of the laboratory and various fittings provided on the laboratory table as well as the side shelves.
  2. Students are expected to conduct themselves in a responsible manner at all times in the lab.
  3. They are advised not to work alone in the lab.
  4. Experiments should be performed in the presence of the lab instructor and other laboratory staff.
- 

**Q.18 What precautions should be taken before disposing of laboratory waste in drains?**

**Ans.**

1. Do not pour chemicals down the drains and do not utilize the sewer for chemical waste disposal.
  2. Keep all sink traps and floor drains clean.
  3. Laboratory chemical waste can be disposed of in sewer or trash bin if they are non-hazardous materials.
  4. Acids and bases are first neutralized followed by sewer disposal.
- 

### **Chemical Hazards in the Laboratory**

**Q.19 What are explosive chemicals and flammable chemicals?**

**Ans. Explosive Chemicals:** Chemicals that cause a sudden release of pressure, gas, and heat when they experience sudden shock are called explosive chemicals.

**Examples** of chemicals which are expected to explode are picric acid, 2,4-dinitrophenyl hydrazine, benzoyl peroxide, nitrocellulose, etc.

**Flammable Chemicals:** Flammable chemicals or mixtures are those which have a flashpoint around room temperature. Examples of flammable compounds are ethers, methylated spirit, benzene, acetone, petrol, etc.

---

**Q.20 What are the disadvantages of corrosive chemicals?**

**Ans. Disadvantages of Corrosive Chemicals:**

1. Corrosive chemicals attack living tissues when they come in contact with them.
  2. They can be in the form of solids, liquids, or gases. Such chemicals attack skin, eyes, respiratory tract, and the intestine as well.
  3. Whenever you work with corrosive chemicals, wear splash goggles instead of safety glasses and use a face shield.
- 

**Q.21 What is a toxic chemical? Give an example.**

**Ans.** A toxic chemical is a poisonous material which is capable of causing serious health problems.

**Examples:** Mercury (Hg), benzene (C<sub>6</sub>H<sub>6</sub>), chlorine (Cl<sub>2</sub>), pesticides, ammonia (NH<sub>3</sub>), and hydrogen cyanide (HCN) are some examples of toxic chemicals.

---

**Q.22 What precautions should be taken when using toxic chemicals?**

**Ans.** The following safety instructions may be ensured in case you intend to work with toxic chemicals:

1. Wear gloves, masks, or other protective devices.
  2. Keep the work area well ventilated.
  3. Keep the toxic chemicals in their original container.
  4. Wash your hands with soap and water after you finish.
- 

**Q.23 What are reactive chemicals?**

**Ans.** The reactivity of chemicals is vital for the production of many chemicals, pharmaceutical, and food products which are in our daily use.

**Hazards:** When chemical reactions are not properly performed, they may cause fires and explosions as they may evolve dangerous gases. These reactions may result in extreme damage to life and property.

**Examples** of reactive chemicals are calcium hydride ( $\text{CaH}_2$ ), sodium (Na), lithium (Li), azides, picric acid, aluminium chloride ( $\text{AlCl}_3$ ), benzoyl peroxide, etc.

---

**Q.24 What are the precautions for using reactive chemicals?**

**Ans.**

1. Handle reactive chemicals with utmost care. Segregate these from other chemicals while storing.
  2. Appropriate measures should be taken before performing reactions with reactive chemicals. Utilize shields and heavy gloves.
  3. Minimize the quantity required for the experiment.
  4. Glass equipment must be shielded by wrapping with tape.
- 

**Q.25 What are the harms of hazardous radiation?**

**Ans.**

1. When a person is exposed to a high dose of radiation, it can damage the functioning of tissues and organs and can cause vomiting, radiation burns, hair loss, and radiation syndrome.
  2. Radioactive materials that emit alpha ( $\alpha$ ) and beta ( $\beta$ ) particles inflict extreme damage when inhaled or injected. Gamma ( $\gamma$ ) rays cause external injuries.
  3. Medical X-rays produce ionizing radiation which can affect living tissues.
- 

**Q.26 What are the precautions for asphyxiant chemicals?**

**Ans.**

1. Store and use asphyxiant chemicals in well-ventilated areas with plenty of air.
  2. Wear a full lab coat, safety glasses, standard gloves, long trousers, and closed-toed shoes.
  3. Dispose of the waste strictly according to the instructions.
  4. If exposed to such chemicals, wash the exposed part with running water and seek medical attention.
- 

**Q.27 Define corrosive chemical. Give its safety instructions.**

**Ans.** Corrosive chemicals attack living tissues when they come in contact with them. They can be in the form of solids, liquids, or gases. Such chemicals attack skin, eyes, respiratory tract, and the intestine as well.

**Examples** of corrosive chemicals are mineral acids including HF (hydrofluoric acid), caustic alkalis (NaOH, KOH), acetic acid (glacial), etc.

**Safety Precautions:**

1. Whenever you work with corrosive chemicals, wear splash goggles instead of safety glasses and use a face shield.
  2. Corrosive chemicals must be used in a fume cupboard to avoid breathing corrosive vapours.
  3. While mixing concentrated acids with water, always add acid slowly to water and not vice versa.
  4. Ensure eyewash and emergency shower is available.
- 

**Q.28 Define toxic chemical. Give its safety instructions.**

**Ans. Toxic Chemical:** A toxic chemical is a poisonous material which is capable of causing serious health problems.

**Examples:** Mercury (Hg), benzene (C<sub>6</sub>H<sub>6</sub>), chlorine (Cl<sub>2</sub>), pesticides, ammonia (NH<sub>3</sub>), and hydrogen cyanide (HCN) are some examples of toxic chemicals.

**Safety Instructions:**

1. Wear gloves, masks, or other protective devices.
  2. Keep the work area well ventilated.
  3. Keep the toxic chemicals in their original container.
  4. Do not work alone.
- 

**Q.29 Define reactive chemical. Give its safety instructions.** taleemzone.com

**Ans. Reactive Chemical:** The reactivity property of chemicals is vital for the production of many chemicals, pharmaceutical, and food products which are in our daily use.

**Examples** of reactive chemicals are calcium hydride (CaH<sub>2</sub>), sodium (Na), lithium (Li), azides, picric acid, aluminium chloride (AlCl<sub>3</sub>), benzoyl peroxide, etc.

**Safety Instructions:**

1. Handle reactive chemicals with utmost care. Segregate these from other chemicals while storing.
  2. Appropriate measures should be taken before performing reactions with reactive chemicals. Utilize shields and heavy gloves.
  3. Minimize the quantity required for the experiment.
  4. Glass equipment must be shielded by wrapping with tape.
- 

**Q.30 How does radiation damage animal tissues? Give its safety instructions.**

**Ans.** When a person is exposed to a high dose of radiation, it can damage the functioning of tissues and organs and can cause vomiting, radiation burns, hair loss, and radiation syndrome. Radioactive materials that emit alpha (α) and beta (β) particles inflict extreme damage when inhaled or injected. Gamma (γ) rays cause external injuries. Medical X-rays produce ionizing radiation which can affect living tissues.

**Safety Instructions:**

1. Keep radioactive sources shielded.
  2. Avoid prolonged exposure to the radiation.
  3. Stay inside; walls and ceilings can protect you from radiation fallout.
  4. Never operate equipment that produces radiation without sufficient training.
- 

**Q.31 Define Asphyxiation Hazards. Give its safety instructions.**

**Ans. Asphyxiation Hazards:** It is a type of hazard in which a gas or vapour can cause unconsciousness or death through suffocation.

**Examples** of chemical asphyxiants are hydrogen cyanide (HCN), carbon monoxide (CO), nitrogen (N<sub>2</sub>), argon (Ar), helium (He), methane (CH<sub>4</sub>), and carbon dioxide (CO<sub>2</sub>), etc.

**Safety Instructions:**

1. Store and use asphyxiant chemicals in well-ventilated areas with plenty of air.
  2. Wear a full lab coat, safety glasses, standard gloves, long trousers, and closed-toed shoes.
  3. Dispose of the waste strictly according to the instructions.
  4. If exposed to such chemicals, wash the exposed part with running water and seek medical attention.
- 

## **Personal Protective Equipment (PPE) in the Laboratory**

### **Q.32 What is PPE?**

**Ans.** Personal Protective Equipment should be made available to students to face any emergency situation which may arise in the lab. They are also useful to reduce exposures to hazardous chemicals.

**Examples:** Proper protective equipment includes such items as lab coats, protective glasses, face shields, aprons, boots, and hearing protection.

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## **Location of Fire Extinguisher**

### **Q.33 What is the importance of fire extinguishers?**

**Ans.** Chemical laboratories using such materials which are likely to catch fire during experiments must have a portable fire extinguisher. This equipment can quickly be used to control a small fire if it is applied by a student individually.

---

## **Constructed Response Questions**

### **Q.1 (Ex. Q.3 (i)) How will you handle an emergency situation caused by fire due to short circuiting?**

**Ans.** If a fire occurs due to short-circuiting, here's how to handle the emergency situation:

1. It's crucial to remain calm to think clearly and act effectively. Immediately yell "Fire!" to alert everyone in the vicinity. This helps ensure that everyone is aware of the situation.
  2. If it's safe to do so, call emergency services or have someone else do it. Provide them with the necessary information about the location and nature of the fire.
  3. Follow the established evacuation routes. Do not use elevators, as they may become inoperable. Help others if you can, but do not put yourself in danger.
  4. If the fire is small and you have been trained to use a fire extinguisher, you can attempt to put it out. Use the PASS technique:
    - o Pull the pin.
    - o Aim the nozzle at the base of the fire.
    - o Squeeze the handle.
    - o Sweep side to side.
  5. Do not re-enter the building until emergency services declare it safe.
- 

### **Q.2 (Ex. Q.3 (ii)) What type of reactions should be carried out in a fume cupboard?**

**Ans.** In a fume cupboard (or fume hood), you should carry out the following types of reactions:

1. Reactions involving volatile chemicals that can release harmful vapours or gases should be conducted in a fume cupboard to prevent inhalation.
  2. Any reactions that involve toxic or hazardous substances, such as heavy metals or certain organic solvents, should also take place in a fume cupboard to minimize exposure.
  3. When working with corrosive materials, such as strong acids or bases, a fume cupboard is essential to protect against harmful splashes and vapours.
  4. If a reaction is highly exothermic and could produce fumes or gases, it's safer to conduct it in a fume cupboard.
- 

**Q.3 (Ex. Q.3 (iii)) Put forward at least two suggestions to improve safety in the lab.**

**Ans.** Here are two suggestions to improve safety in the lab:

1. Conduct regular safety training sessions for all lab personnel. This training should cover proper handling of chemicals, use of safety equipment, and emergency procedures. Ensuring everyone is knowledgeable about safety protocols can significantly reduce the risk of accidents.
  2. Ensure that all chemicals are properly labeled with clear hazard information and stored according to their compatibility. This includes using appropriate containers and keeping reactive substances away from each other. Proper labeling and storage help prevent accidental mixing and exposure.
- 

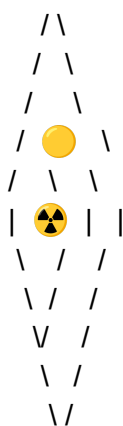
**Q.4 (Ex. Q.3 (iv)) Can you identify warning symbols posted for radiation and asphyxiant chemicals?**

**Ans.**

**Radiation Hazard Symbol:**

(Black trefoil on yellow background)

text



**Asphyxiation Hazard Symbol:**

(Usually a symbol showing a person gasping or an "Asphyxiation" warning sign)

text



DANGER

Risk of Asphyxiation

---

**Q.5 (Ex. Q.3 (v)) Why can sudden shock cause some chemicals to explode?**

**Ans.** Sudden shock can cause some chemicals to explode for a couple of reasons:

- Shock can provide enough energy to break chemical bonds, leading to rapid reactions that release energy explosively.
  - If the shock causes a rapid change in temperature or pressure in a closed container, it can exceed the container's limits, resulting in an explosion.
- 

**Multiple Choice Questions (Exercise)**

1. Safety in the chemistry laboratory is:  
**(d) a shared responsibility ✓**
2. Accidents often result from:  
**(d) all of the above ✓**
3. The label "Warning" on a chemical bottle signifies:  
**(c) That user should be careful when using chemical ✓**
4. The label "Corrosive" on a chemical bottle indicates:  
**(c) That the contact destroys living tissue ✓**
5. Example of highly toxic chemicals:  
**(c) Potassium Cyanide (KCN) ✓**
6. Example of self-reactive chemical:  
**(c) Picric acid ✓**
7. When diluting an acid with water:  
**(c) Always add acid to water ✓**
8. What should you do in case of a fire drill in lab?  
**(c) Close gas valves and turn off all equipment ✓**

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