UNIT 13

Laboratory and Practical Skills

Descriptive Questions

Q.1 (Ex. Q. 4 (i)) **Explain hazards due to explosive and toxic chemicals.** 092013001

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

i. Explosive Chemicals: Chemicals that cause a sudden release or 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 -di-nitrophenyl 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 Chemical: A toxic chemical is a poisonous material which is capable of causing serious health problems

Examples: Mercury, benzene, chlorine, pesticides, ammonia, 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.

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

Ans. 092013002

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

- Always use appropriate PPE(Personal Practice Equipment) such as gloves, goggles and lab coats to protect against chemical exposure.
- Store chemicals in designated areas, guidelines for compatibility and ensuring containers are clearly labeled to prevent accidental mixing.
- When working with volatile or toxic substances, use fume hoods to minimize inhalation risks and ensure adequate ventilation.
- Keep open flames away from areas where flammable or explosive chemicals are present to prevent ignition and explosions.
- 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:** 092013003

Several signs and symbols are posted in different areas of the lab and bottles containing hazardous chemicals. These signs indicate that specific precautions must be

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observed according to the requirement 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 a 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 equipments and specified areas for specific tasks. Proper warning signs ought to be posted on these areas to ensure that every person entering there must understand and act accordingly to maintain laboratory safety.



Q.4 (Ex. Q. 4 (iv)) Name some toxic chemicals. Describe the effects of spreading toxic gas in the lab. 092013004

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 hydrogen cyanide.

Effects:

Chlorine Gas: This gas can cause problem 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 over a corrosive and explosive chemical due to an accident. Which emergency measures you will take to tackle the situation.**

Ans. 092013005 In the event of a spill involving a corrosive and explosive chemical, the following emergency measures should be taken:

- Immediately clear the area of all personnel to ensure safety. Make sure everyone is at a safe distance from the spill.
- 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.
- If it is safe to do so, put on appropriate PPE, such as gloves, goggles, and a lab coat, before approaching the spill.
- 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. 092013006 To prevent future accidents like the chlorine gas leak in Lahore, several concrete proposals can be implemented:

- Enforce stricter regulations on the transport of hazardous materials. This includes using specialized tankers designed to contain leaks and withstand accidents.
- Conduct routine inspections of vehicles used for transporting hazardous materials to ensure they meet safety standards and are in good condition.
- Provide comprehensive training for emergency responders and local communities on how to handle hazardous material spills effectively.
- 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.
- Implement real-time monitoring systems for detecting gas leaks during transportation. This can include sensors that alert authorities immediately if a leak is detected.
- 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

Q.1 Define chemistry laboratory? Give the precautions for students working in the laboratory? 092013007

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

Precautions of Students:

i. Before starting the laboratory work, a student should get himself familiarized with the layout of the laboratory and various fittings provided in the laboratory table as well as the side shelves.
ii. Students are expected to conduct themselves in a responsible manner at all times in the lab.
iii. They are advised not to work alone in the lab.
iv. Experiments should be performed in the presence of lab instructor and other laboratory staff.
v. All equipments should be checked before use whether they are working properly according to the requirements of the experiments.
vi. Determine the potential hazards related to any equipment or the experiment before beginning any work.
vii. 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.
viii. Don't bring any food items in the lab. Never taste or smell any compound or a gas. If it is necessary to smell a gas it is always advised to waft the fumes or vapor towards your nose

Q.2 What are flammable and explosive chemicals? Give their safety instructions. 092013008

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 -di-nitrophenyl 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.

i. Obtain prior approval from your teacher.
ii. Always use smallest quantity of the chemicals.
iii. Always conduct experiment in fume hood.
iv. Remove all other chemicals and apparatus around you.
v. Inform other people working with you.
vi. Always wear safety spectacles, gloves and lab coat.
vii. Always keep flammable compounds away from heat source.
viii. Pour the flammable liquid very carefully.
ix. Properly dispose off any hazardous waste.
x. Do not store flammable liquid in refrigerator.

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Short Answer Questions (Exercise)

Q.1. Name some corrosive chemicals. 092013009

Ans. Example of corrosive chemicals are mineral aids including HF, caustic alkalies, acetic acid (glacial) etc.

Q.2. What type of safety precautions are adopted to avoid damage due to explosive chemicals? 092013010

Ans.

i. Obtain prior approval from your teacher.
ii. Always use smallest quantity of the chemicals.
iii. Always conduct experiment in fume hood.
iv. Remove all other chemicals and apparatus around you.
v. Inform other people working with you.

Q.3. What type of damages can reactive chemicals cause? 092013011

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

Q.4. Indicate two such safety instructions which are required to avoid radiation. Or What are the precautions to avoid dangerous radiation? 092013012

Ans.

i. Stay inside as walls and ceilings can protect you from radiation fall out.
ii. Never operate equipment that produces radiation without sufficient training.

Q.5. Which chemicals can cause suffocation? 092013013

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

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

Q.6. Why signs and symbols are posted on lab and chemical bottles? 092013014

Ans. Several signs and symbols are posted in different areas of the lab and bottles containing hazardous chemicals. Because these signs indicate that specific precautions must be observed according to the requirements 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 fire caused by chemicals should be handled? 092013015

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

i. Stay calm and do not panic.
ii. Alert people in the area to evacuate.
iii. In case of fire, close doors to confine fire. Use fire extinguisher to put down the fire.
iv. Call and assist emergency staff.

Q.8. Why emergency drills are important to face emergency situations? 092013016

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 involve them practically to handle the emergency situations. During drill firefighting and other equipments must be checked whether they are in proper working order or not.

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Q.9. Why flammable liquids are not stored in refrigerator? 092013017

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

- Refrigerators can trap flammable vapors, creating a risk of explosion if there's a spark from electrical components.
- Refrigerators offer contain material 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? 092013018

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 depend 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 explosive chemicals are likely to explode? 092013019

Ans. If you ever come across any chemical that you suspect to 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? 092013020

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

- Use sodium bicarbonate for acids or vinegar for alkalis to neutralize the waste.
- Add plenty of water to dilute the neutralized waste.
- Ensure the pH is neutral (around pH 7) using pH paper.
- Check local disposal regulations for hazardous waste.

Q.13. What does warning sign "caution" convey the message? 092013021

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. 092013022

Ans. Some explosive chemicals include:

- Picric acid
- 2,4-dinitrophenyl hydrazine

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- Benzoyl peroxide
- Nitrocellulose

Q.15. Should emergency drills be compulsory or optional? 092013023

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.

SLO Based Additional Short Answer Questions

Introduction

Q.16. What is chemistry laboratory? 092013024

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? 092013025

Ans. Reactions of Students:

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

Q.18. What precautions should be taken before disposing of laboratory waste in drains? 092013026

Ans.

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

Chemical Hazards in the Laboratory

Q.19. What are the explosive chemicals and flammable chemicals? 092013027

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-di-nitrophenyl hydrazine, benzoyl peroxide, nitrocellulose etc.

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? 092013028

Ans. Disadvantages of Corrosive Chemical:

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

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Q.21. What is toxic chemical? Give example. 092013029

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

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

Q.22. What precautions should be taken when using toxic chemicals? 092013029

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

i. Wear gloves, masks or other protective devices.
ii. Keep the work area well ventilated.
iii. Keep the toxic chemicals in original container.
iv. Wash your hands with soap and water after you finished.

Q.23. What are reactive chemicals? 092013030

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, explosions as they may evolve dangerous gases. These reactions may result to an extreme damage to life and property.

Examples of reactive chemicals are calcium hydride Na, Li, azides, picric acid, $AlC\ell_3$, benzoyl peroxide etc.

Q.24. What are the precautions for using reactive chemicals? 092013031

Ans.

i. Handle reactive chemicals with utmost care. Segregate these from other chemicals while storage.
ii. Appropriate measures should be taken before performing reactions with reactive chemicals. Utilize shield and heavy gloves.
iii. Minimize the quantity required for experiment.
iv. Glass equipment must be shielded by wrapping with tape.

Q.25. What are the harms of hazards radiation? 092013032

Ans.

i. 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.
ii. Radioactive materials that emit alpha and beta particles inflict extreme damage when inhaled or injected. Gamma rays cause external injuries.
iii. Medical x-rays produce ionizing radiation which can affect living tissues.

Q.26. What are the precautions for asphyxiant chemicals? 092013033

Ans.

i. Store and use asphyxiant chemicals in well-ventilated areas with plenty of air.
ii. Wear a full lab coat, wear glasses and standard gloves, long trousers and closed-toed shoes.
iii. Dispose off the waste strictly according to the instructions.
iv. 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? 092013034

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 in the intestine as well.

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

Safety Precautions:

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i. Whenever you work with corrosive chemical, wear splash goggles instead of
ii. Safety glasses and use a face shield. Corrosive chemicals must be used in a fume cupboard to avoid breathing corrosive vapours.
iii. (While mixing concentrated acids with water, always add acid slowly to water and not vice versa.)
iv. Ensure eyewash and emergency shower is available.

Q.28. Define toxic chemical? Give its safety instructions. 092013035

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

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

Safety Instruction:

i. Wear gloves, masks or other protective devices.
ii. Keep the work area well ventilated.
iii. Keep the toxic chemicals in original container.
iv. Do not work alone.

Q.29. Define Reactive Chemical? Give its safety instructions. 092013036

Ans. Reactivity: 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, $AlCl_3$ benzoyl peroxide etc.

Safety instructions:

i. Handle reactive chemicals with utmost care. Segregate these from other chemicals while storage.

ii. Appropriate measures should be taken before performing reactions with reactive chemicals. Utilize shield and heavy gloves.

iii. Minimize the quantity required for experiment.

4. Glass equipment must be shielded by wrapping with tape.

Q.30. How radiation damages animal tissues. Give its safety instruction. 092013037

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:

i. Keep radioactive sources shielded.
ii. Avoid prolonged exposures to the radiation.
iii. Stay inside walls and ceiling that can protect you from radiation fall out.
iv. Never operate equipment that produces radiation without sufficient training.

Q.31. Define Asphyxiation Hazards. Give it, Safety instruction. 092013038

Asphyxiation it is a type of Hazard in which a gas or vapour can cause unconscienced or death through suffocation.

Example:

Examples of chemical asphyxiants are Hydrogen cyanide, Carbon monoxide, Nitrogen, Argon, Helium, Methane and Carbon dioxide etc.

Safety instructions:

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

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Personal Protective Equipment (PPE) in the Laboratory

Q.32. What is PPE? 092013039

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.
Example: Proper protective equipment include such items as lab coat, protective glasses, face shields, apron, boots and hearing protection.

Location of Fire Extinguisher

Q.33. What is the importance of fire extinguisher? 092013040

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? 092013041

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

- 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.
- 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.
- 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.
- 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:
  - Pull the pin.
  - Aim the nozzle at the base of the fire.
  - Squeeze the handle.
  - Sweep side to side.
- 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 fume cupboard? 092013042

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

- Reactions involving volatile chemicals that can release harmful vapours or gases should be conducted in a fume cupboard to prevent inhalation.
- 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.
- When working with corrosive materials, such as strong acids or bases, a fume cupboard is essential to protect against harmful splashes and vapours.
- If a reaction is highly exothermic and could produce fumes or gases, it's safer to conduct it in a fume cupboard.

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Q.3 (Ex. Q. 3 (iii)) **Put forward at least two suggestions to improve safety in the lab.** 092013043

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

- 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.
- 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?** 092013044

Ans.



Q.5 (Ex. Q. 3 (v)) **why sudden shock can cause some chemicals to explode?** 092013045

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:** 092013046
   (a) the responsibility of the students only
   (b) the responsibility of the professor only
   (c) the responsibility of the lab incharge only
   (d) a shared responsibility
2. **Accidents often result from:** 092013047
   (a) making mistakes
   (b) failure to use common sense
   (c) failure to follow instructions
   (d) all of the above
3. **The label "Warning" on a chemical bottle signifies:** 092013048
   (a) That the chemical can cause less serious injury
   (b) That the chemical can cause serious injury
   (c) That user should be careful when using chemical
   (d) That user should open it only in the presence of a teacher
4. **The label "Corrosive" on a chemical bottle indicates:** 092013049

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(a) That the material is an oxidizing agent
(b) That the material can degrade rapidly upon exposure
(c) That the contact destroys living tissue
(d) That the chemical can explode

5. **Example of highly toxic chemical:** 092013050
(a) Ethanol (b) Acetic acid
(c) Potassium Cyanide
(d) Potassium permanganate

6. **Example of self-reactive chemical:** 092013051
(a) Potassium (b) Phenol
(c) Picric acid (d) n-Hexane

7. **When diluting an acid with water:** 092013052
(a) Do it quickly
(b) Do not stir the container
(c) Always add acid to water
(d) Always add water to acid

8. **What should you do in case of a fire drill in lab?** 092013053
(a) Run to safety shower
(b) Climb into the fume cupboard
(c) Close gas values and turn off all equipment
(d) Carry chemicals out of the lab

Answer Key

1	d	2	d	3	c	4	c	5	c
6	c	7	c	8	c				

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