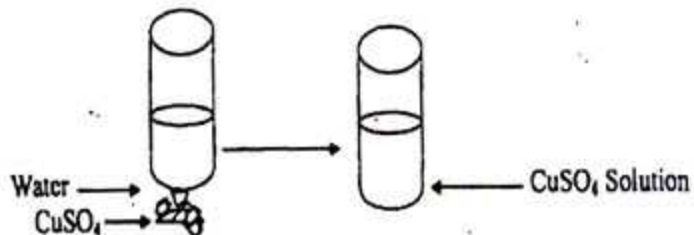


EV SSC CHEMISTRY

Chapter-1: Concept of Chemistry

Ques. ► 1



[Pabna Cadet College, Pabna]

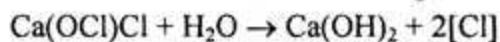
- What is weak alkali? 1
- Why bleaching powder is used to purify water? 2
- What type of process is shown in the process given in the stem? 3
- Is it possible to separate the solute and solvent from CuSO_4 solution? Give opinion. 4

Answer to the question no. 1

a The alkalis that dissolve partially in aqueous solution are weak alkali.

b Bleaching powder is used to purify water. This process of purification of water is called chlorination.

If a certain amount of bleaching powder is added in water. Produced chlorine oxidized the germs and kills them



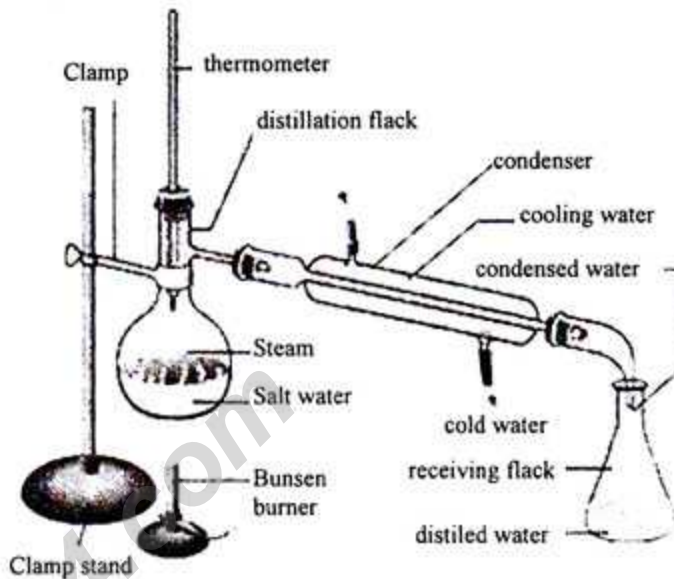
Filter the water after adding bleaching powder and it becomes drinkable.

c The process shown in the stem is a chemical process. Copper sulphate is mixing with water to make copper sulphate solution. If the process is further studied it can be found that the process of adding water to the copper sulphate is an exothermic process, that is, while adding water the compounds release heat. The color of the salt is white at the solid stage. While adding water the color turns blue and at one stage it becomes crystal. This process is known as hydration. Further adding water it dissolves the salt and become ionized. Thus the solution is made.

d The solution contains copper sulphate as solute and water as solvent. They can be separated.

When sufficient heat is applied on the solution, water evaporates. The vaporized water escapes the jar. Now if the vaporized water is further cooled, liquid water can be collected again. Continuous heat will turn the solution in blue crystal of copper sulphate, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$. Then on further heating the rest

of the water also evaporates and only CuSO_4 remains on the jar. And the water is collected at a pot placed at the end of cooling process. Thus the solute and solvent are separated.



Ques. ► 2



(i)



(ii)



(iii)



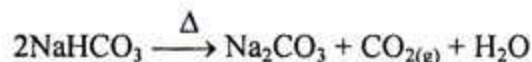
(iv)

[Cumilla Cadet College, Cumilla]

- What is the formula of Soda ash? 1
- Why thermoplastic polymers can be easily expanded, curved and melted on heating? 2
- Which sign is suitable for KMnO_4 & aerosol? Explain. 3
- Make a chart of preservation and precaution for chemical label by stem sign (i) & (iii). 4

Answer to the question no. 2

a Soda ash or washing soda is produced when sodium hydrogen carbonate dissociates on heating.



b As thermoplastic polymer form long thin crossed linked chain. In this type of polymer chain strong bonds form between the carbon, and their remains a weak attraction force among the neighboring chains. These chains are able to cross over one another. As a result these polymers can be easily expanded, curved and melted on heating.

c Flame of Fire: For aerosol, we can use sign no ii.

Flammable substance- gas, liquid, solid. May catch fire easily. Produce heat on reaction such as aerosol, petroleum. Keep them away from flame and heat, avoid the situation of friction.

Flame on circle: For KMnO_4 we can use this sign.

Oxidizing agent gas or liquid substances, like- KMnO_4 . May cause problems with breathing if inhaled, and may cause of corrosion if come in contact with skins. If gaseous substances, store in an airtight container, do not keep in a container that may support oxidizing reaction.

d The name of the sign 1 is Health Hazard. We can take the following preservations and precautions:

1. Sensitive to respiratory system, mutagenic, carcinogenic.
2. Keep away from human and store in safe places.
3. Wear gloves in hand, safety glass in eyes and use masks on nose and mouth when in use.
4. Avoid touching.
5. The reaction mixture needs to be treated after experiments.

The name of the sign 2 is Radioactive Ray. We can take the following preservations and precautions:

1. Highly hazardous ray.
2. These rays may cripple the human body and cause cancer.
3. Store in a thick container that does not to allow the ray to pass away.
4. Maintain safety distance, wear necessary dresses, wear special glasses when using.

Ques. 3



[Jhenidah Cadet College, Jhenidah]

- a. What is rust? 1
- b. Explain the change of burning of candle? 2
- c. If the caps are opened of the stem cylinder then which gas spread out faster, explain? 3
- d. How will you obtain (I) gas from (II) and (II) from (I), explain. 4

Answer to the question no. 3

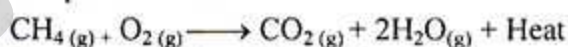
a If things made of iron or iron alloy are left in the open for a long time, their upper part produces a reddish-brown substance. This substance is called rust. The substance created due to corrosion of iron is hydrated ferric oxide ($\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$).

b Wax is a mixture of various hydrocarbons. Organic compounds made of hydrogen and carbon are known as hydrocarbons. In the burning of a wax, three states of matter can be observed simultaneously. There is a thin liner inside the wax. When we add fire to it, the hydrocarbon particles around the liner melt into liquid. The liquid wax absorbs heat and

vaporizes first. Then the vaporized wax starts the reaction with oxygen of air and produces carbon dioxide, water vapour, light and heat. A portion of the liquid wax remains and turns solid again. Thus, in the presence of heat we see three states of wax.

c As both the gases are in a confined place they are in high pressure when the caps of the cylinder will be opened, the gases will start to escape from the cylinders due to the effusion phenomena. The passage of gases from a high-pressure zone to a low-pressure zone through a fine pore is called effusion. As the gases won't escape from a fine pore the phenomena can also be called diffusion. The tendency of solid, liquid or gas to spread spontaneously and uniformly in any medium is called diffusion. In the diffusion process, solid, liquid or gas moves spontaneously from a place of higher concentration to lower concentration. Effusion and diffusion are by nature, same kind of actions. Both the actions depend on the molecular weights of the gas. CO_2 has a molecular weight of $12+16 \times 2=44$, and CH_4 has a molecular weight of $12+1 \times 4 = 16$. Methane is lighter than carbon dioxide, hence it will escape first. The lower the molecular weight faster it will move. This is the principle of effusion and diffusion.

d Gas 1 can be obtained from gas 2 by combustion reaction. Gas 1 is CO_2 and gas 2 is CH_4 . The process in which any compound or element is burnt in presence of atmospheric oxygen and converts to oxides of its elements is called combustion reaction. Usually, heat is evolved in a combustion reaction. This process also involves electron exchange. For example, natural gas or methane reacts with the oxygen of air and produces carbon dioxide and water.



From carbon-di-oxide, Methane and water are produced when hydrogen is heated with carbon-di-oxide at 250°C temperature in presence of nickel catalyst.



Ques. 4 To celebrate Pohela Boishakh, each year a fair is arranged at the bank of river Boiragichor. Beside arrangements for entertainments, many commodities are sold like cosmetics, etc. And to maintain uninterrupted electricity there is a generator.

[St. Joseph Higher Seconadry School, Dhaka]

- a. What is food preservation? 1
- b. Why we should carefully handle, organic peroxide, potassium chlorate, gunpowder etc? 2
- c. Mention the dependency of chemistry is cosmetics, toys and consumer goods according to them stem. 3
- d. Describe the comparative relation between Chemistry and the first and last arrangements in the stem. 4

Answer to the question no. 4

a Food preservation is the process of preventing the growth of bacteria on food.

b Organic Peroxide, Potassium Chlorate, gunpowder etc. are explosive substances. They are very sensitive. They can be exploded by themselves or due to small pressure, which many times, causes severe accident. For this reason that should be handled with care.

c Some dependencies of chemistry in daily lives are mentioned below:

Substance	Element	Source
Air taken by inhalation	Mostly oxygen	Environment, air
Brush, comb, artificial color, paper, exercise book, ink, pencil, pen	Made by the combination of different chemical compounds	Made in industries through the chemical changes of different materials
Drinking water	Pure water is made of hydrogen and oxygen atoms. There are other minerals too in drinking water.	Water exists in nature, eg. river, drain, canal, khal, bill, ocean, rain, water fall etc.
Food	Starch, protein, fat all are organic compounds and different mineral substances.	Plants (by photosynthesis) and animals produce and deposit foods by different process. When we take food, metabolic process occurs in our bodies and we get energy.
Clothes	They are made from the combination of organic compounds and fibers.	Clothes are made in textiles and fabrics industries by combining dyes with natural or synthetic fibers made of different compounds through chemical reactions.
Fertilizer	These are made of oxygen, nitrogen, carbon, phosphorus etc. and combination of different chemical compounds.	Fertilizers are manufactured in industries by chemical reactions. Chemical fertilizers supply nutrients the soils with nutrients for the plants.

d Physics discusses magnet, electricity, different machines etc. Battery used for getting electricity is contribution of chemistry. Energy gleaned by burning oil, gas or coal is the source for vehicles and electricity. Chemistry is also dependent on physics. Physical chemistry is a branch of chemistry, the theories of which are essentially dependent on theories and formulas of physics.

Ques. 5 i) Green Mango → Ripen Mango

ii) Iron → Rust

iii) $\text{Wax} + \text{O}_2 \rightarrow \text{X} + \text{Y} + \text{Energy}$

[Rajshahi Cantonment Public School and College, Rajshahi]

- What is bronze? 1
- Why is antacid used to cure the acidity in stomach? 2
- Explain the chemical changes of reaction-iii 3
- What type of changes are occurred in the reaction-i and reaction-ii? Analyze with logic. 4

Answer to the question no. 5

a The alloy of mixture of tin and copper is bronze.

b People who have excess hydrogen chloride gas produced in their stomach due to metabolic process of body take medicines like antacid on consultation with physicians. Antacids contain metallic hydroxide which is alkaline and hydrogen chloride gas in acidic. Alkaline antacid neutralizes acidic hydrogen chloride gas through this neutralization reaction.

c Reaction (iii) is a combustion reaction. The process in which any compound or element is burnt in presence of atmospheric oxygen and converts to oxides of its elements is called combustion reaction. Usually heat is evolved in combustion reactions. Wax is a compound of carbon and hydrogen. Burning wax means the burning of carbon compound, which is combustion reaction that results in the production of carbon dioxide gas, water vapor and heat.

d Color is a property of chemical substance. In reaction (i), the change in the color of green mango to yellow means the creation of yellow colored new compound in the mango through biochemical process.

Iron is hard, rust is fragile. In reaction (ii), pure iron in presence of moisture reacts with oxygen of air and forms a substance named iron oxide, which is generally known as rust.