

ANSWERS TO THE SHORT QUESTIONS

POLYMERS

Q.1 Why is industry necessary for a country?

Ans: The people of a country need resources for their livings. Natural resources are exhausting every moment. This is due to growing population. High standard of living also needs the industrial products.

Q.2 What is a need for fertilizers?

(Multan 2006, Multan 2008, Lahore 2011, Multan 2012, Multan 2013)

Ans: Fertilizers stimulate the process of metabolism in plant cells. They help the growth of plants and give additional supply of the food. They also maintain the pH of the soil between 7 – 8.

Q.3 What are micronutrients? Give their names.

(Multan 2008, Sargodha 2011, Lahore 2011, Lahore 2012, Lahore 2013)

Ans: Those elements which are required in very small amount for the growth of plants are called micronutrients. These elements are B, Cu, Fe, Mn, Zn, Mo and Cl_2 .

Q.4 What are macronutrients? Give their names.

(Mirpur 2006, Multan 2008, Faisalabad 2008, Mirpur 2011, Sargodha 2011, Lahore 2012, Lahore 2013, Guj. 2013)

Ans: Nutrients which are required in large amounts for the growth of plants are called macronutrients. The elements are carbon, hydrogen, oxygen nitrogen, phosphorus, potassium, calcium, magnesium and sulphur.

Q.5 Give the important properties of fertilizer.

(Lahore 2012, Multan 2012, Lahore 2013, Multan 2013)

Ans: The derived elements of fertilizers should be water soluble. Fertilizers should be stable in the soil. It should be cheap to manufacture and should not be injurious to plants. Moreover, they should be stable enough to stand for a long time.

NITROGEN FERTILIZER

Q.6 Give the names and formulas of important nitrogenous fertilizers:

Ans: Important nitrogen fertilizers are:

$(NH_4)_2SO_4$, NH_4NO_3 , NH_4Cl , $Ca(NO_3)_2$, $CaCN$, NH_3 , $NH_2CO NH_2$.

Q.7 Why nitrogen is important for plants?

(Faisalabad 2008, Rwp. 2011, D.G. Khan 2013)

Ans: Nitrogen is essential for the rapid growth of plants. It is the main constituent of proteins. It gives green colour to the leaves and increases the yield and quality of plants.

Q.8 How NH_3 is given to the plants?

Ans: Ammonia contains 82 % nitrogen. It is gas at ordinary temperature and is directly injected 6 – 8 inches in the form of liquid under the surface of the soil, so that it may not seep out.

Q.9 What are the important steps for the manufacture of urea?

(Lahore 2011, D.G. Khan 2011)

Ans: Urea is prepared in six steps:

- (i) Preparation of hydrogen
- (ii) Preparation of NH_3
- (iii) Preparation of ammonium carbamate

- (iv) Preparation of urea
- (v) Concentration of urea
- (vi) Prilling.

Q.10 What do you mean by prilling of urea? (Faisalabad 2011)

Ans: Molten urea is sprayed at the prilling tower. It is done by means of prilling buckets. The molten urea is cooled by air which rises upwards. The molten droplets of urea solidify in the form of prills.

Q.11 What are the properties of ammonium nitrate as a fertilizer?
(Sargodha. 2011, Bahawalpur 2011, D.G. Khan 2013)

- Ans:**
- (i) It is used as a fertilizer for many crops except paddy rice.
 - (ii) It is also used in the combined form with limestone.
 - (iii) It is hygroscopic in nature.

PHOSPHORUS FERTILIZERS

Q.12 What are the types of phosphorus fertilizers? (Guj. 2012)

Ans: There are two important water soluble phosphorus fertilizers:

- (i) Calcium superphosphate, CaH_2PO_4
- (ii) Di-ammonium hydrogen phosphate, $(\text{NH}_4)_2 \text{HPO}_4$.

Q.13 What is the importance of phosphorus for the plants? (F. Abad 2008)

- Ans:**
- (i) Phosphorus stimulates the early growth of plants.
 - (ii) It accelerates the seed and fruit formation.
 - (iii) It increases the resistance to diseases and frosts.

Q.14 What is di-ammonium hydrogen phosphate? Give its uses:

(Guj. 2010, Lahore 2011, F. Abad 2013)

Ans: It is prepared by the reaction of ammonia with H_3PO_3 . It contains 16 % nitrogen and 48 % P_2O_5 . This product contains 75 % of the plant nutrients.

POTASSIUM FERTILIZER

Q.15 What is the importance of potassium fertilizer? (Mirpur 2011)

- Ans:**
- (i) Potassium is needed for the formation of starch, sugar and fibrous material of plants.
 - (ii) It increases the resistance to diseases.
 - (iii) It gives healthy root development.
 - (iv) It helps in the ripening of seeds, fruits and cereals.

Q.16 How potassium nitrate is prepared? Give its composition:

Ans: KNO_3 is prepared on the industrial scale by double decomposition reaction of KCl and NaNO_3 . It contains 13 % nitrogen and 44 % potash.

Q.17 What is the position of fertilizer industry in Pakistan?

Ans: There are approximately 14 plants in private as well as public sector. The total production of urea in Pakistan upto 2002 is 56,30,100 metric tones per annum.

CEMENT INDUSTRY

Q.18 What is historical background of Portland cement?

Ans: An English mason Joseph Aspdin heated a mixture of limestone and clay with water and allowed to stand. The matter was hardened like a stone. This hardened mass resembled with Portland rock.

Q.19 How do you define cement? Give the essential constituents of cement.

(Sargodha 2008, Multan 2012, Lahore 2012)

Ans: The cement is a material which is obtained by burning an intimate mixture of calcareous and argillaceous material at sufficiently high temperature to produce clinker. This clinker is consequently ground to a fine powder. The essential constituents of cement are lime, silica and alumina.

Q.20 Mention three important raw materials for the manufacture of cement:

(Bahawalpur 2011, Lahore 2012)

Ans: The important raw materials used for the manufacture of cement are:

- (i) Calcareous material
- (ii) Argillaceous material
- (iii) Another raw material like gypsum, water and fuel.

Q.21 How do you compare the wet and dry process for the manufacture of cement and on what grounds one of them is chosen? (Sargodha. 2011)

Ans: Dry process needs excessive fine grinding so this process is employed. Then the material is hard. Wet process is free from dust, grinding is easier and the composition of the cement can be easily controlled.

Q.22 What are the five steps in the manufacture of Portland cement?

(Lahore 2012)

- Ans:**
- (i) Crushing and grinding
 - (ii) Mixing in correct proportion
 - (iii) Heating the rotary kiln.
 - (iv) Grinding the clinker.
 - (v) Mixing and grinding of clinker with gypsum.

Q.23 What is the role of rotary kiln in the cement manufacture?

Ans: Rotary kiln heats the material to high temperature to produce the cement clinker. This clinker is crushed to fine powder to get cement.

Q.24 Give different zones in the rotary kiln and their temperature ranges.

(Lahore 2008, Faisalabad 2011, Lahore 2013)

Ans: In preheating zone, the temperature is 500°C. In the decomposition zone, the temperature goes up 800°C. In the burning zone, temperature rises up to 1500°C.

Q.25 What are clinker?

(Faisalabad 2011, Guj. 2013)

Ans: It is the final product from the rotary kiln. These are small greenish black or grey coloured balls. Their sizes vary from small nuts to peas.

Q.26 How the clinker are converted into cement at the final stage?

Ans: Clinker are cooled by air. Gypsum is ground to fine powder and mixed with clinker up to 5 %. This mixture is ground to fine powder.

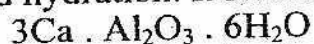
Q.27 What do you mean by setting of cement?

(Rwp. 2008, Faisalabad 2010, Multan 2011, Mirpur 2011, F. Abad 2012, D.G. Khan 2013)

Ans: The reaction of cement with water with the passage of time is called setting of cement, and setting time is noted.

Reactions taking place in first 24 hours:

- (ii) After a short time of the paste formation, tri-calcium aluminate absorbs water. This is called hydration. It forms a colloidal gel of composition.



- (iii) This gel starts crystallizing slowly. It reacts with gypsum having the formula $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. It gives the crystals of calcium sulpho-aluminate. Its formula is as follows:



Q.28 Mention the cement industry in Pakistan:

Ans: There are 22 cement factories in private as well as public sector. Some of them work on the basis of wet process and other on the dry process.

PAPER INDUSTRY

Q.29 Define paper. Give important raw material for the manufacture of paper? (Multan 2011, Rwp. 2011, F. Abad 2012, F. Abad 2013)

Ans: Paper is a sort of material made up of a network of natural, celluloic fibre which have been deposited from aqueous structure. The raw material is of two types:

- (i) Woody raw material (ii) Non-woody raw material

Q.30 What is N.S.S.C. method for paper manufacture? What physical operations are performed?

Ans: It is neutral sulphite semi chemical process and following four physical operations are performed:

- (i) Dry cleaning
(ii) Washing
(iii) Heat treatment
(iv) Physical process for dewatering.

Q.31 What do you mean by dry cleaning in paper manufacture? (Rwp. 2006)

Ans: The air is blown into the raw material. It removes unwanted particles. Wheat grains are separated in the primary dry cleaners. In the secondary dry cleaning, we remove the lumps, dust and sand particles.

Q.32 What process is carried out during digestion in paper manufacture?

(Multan 2008, Rwp. 2011)

Ans: Na_2SO_3 is buffered with Na_2CO_3 and soda ash to have a pH of 7 – 9. The digester is closed carefully and it revolves at 2.5 rotation per minute. The temperature maintained is 160 – 180°C.

Q.33 What is lignin?

Ans: It is an aromatic polymer and it causes the paper to become brittle. It is consisted of 17 – 33 % of dry weight of wood.

Q.34 What are commonly used bleaching agents in paper manufacture?

(Rwp. 2010, Sargodha 2010, Guj. 2012, D.G. Khan 2013)

- Ans:** (i) Oxygen (ii) NaClO
(iii) H_2O_2 (iv) Ozone
(v) Chlorine (vi) $\text{ClO}^\ominus$

Q.35 What are the requirements to get high brightness of pulp during paper manufacture?

Ans: Enough chlorine is required for this purpose. The residence time for chlorine is 45 – 60 minutes and the temperature should be maintained at 45°C. After chlorination, the pulp is washed with hard water at 60°C.

Q.36 What are the major components of paper machine?

Ans: It is consisted of:

- (i) Flow spreader.
- (ii) Head box.
- (iii) Fourdrinier table.
- (iv) Press section.
- (v) Drier section.

Q.37 Mention the paper industry in Pakistan:

Ans: There are more than 30 paper and pulp industries in private as well as in the public sector.