

M.Sc. ENVIRONMENTAL SCIENCE
First Semester
ENVIRONMENTAL CHEMISTRY
(MEV - 102)

Duration: 3Hrs.

Full Marks: 70

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

Answer any *five* of the following questions:

1. Write a short note on chemical composition of air. What are the differences between thermochemical and photochemical reactions? Discuss PAN formation reaction in the atmosphere. (2+3+5=10)
2. "Ozone is harmful as well as useful". -- Justify the statement. Discuss formation and depletion of Ozone. (2+8=10)
3. What is acid rain? Discuss the causes and impacts of acid rain. (2+3+5=10)
4. What are the sources and impacts of suspended materials in water? How will you measure total solids, suspended solids and dissolved solids in a water sample? (2+2+6=10)
5. What do you mean by chemical equilibrium? Nitrogen and Hydrogen gas combine to form Ammonia gas. Write the equilibrium equation for the reversible reaction. Discuss the effect on rate of the reaction if reactants and products are removed separately? (2+2+6=10)
6. What are CFCs? Write formula and IUPAC name of any two CFCs. What are the environmental impacts of CFCs? (2+4+4=10)

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(PART A- Objective Type)

I. Choose the correct answer:

1×20=20

1. Enthalpy of an endothermic reaction is-
(a) always zero.
(b) always negative.
(c) always positive.
(d) may be positive or negative.
2. Photochemical smog is a-
(a) reaction product of oxides of nitrogen and hydrocarbons.
(b) reaction between smoke, fog and oxides of nitrogen.
(c) reaction between hydrocarbons, fog and smoke.
(d) none of above.
3. The free energy change of reversible reaction at equilibrium state of reaction is-
(a) positive (b) negative
(c) zero (d) infinity
4. Which of the following has no effect on the rate of a reaction?
(a) Enthalpy change (b) Temperature
(c) Catalyst (d) Concentration
5. The conjugate acid of HF is-
(a) H_2F^+ (b) F^- (c) HF_2^- (d) F^+
6. True colour in water is due to-
(a) suspended solids (b) dissolved solids
(c) total solids (d) microorganisms
7. An increase of.....is usually sufficient to double the biological activity.
(fill in the blank)
(a) 1°C (b) 10°C
(c) 20°C (d) none of above

8. The most common constituents of alkalinity in water are-
- (a) bicarbonate, carbonate and hydroxide.
 - (b) nitrogen, sodium hydroxide.
 - (c) nitrogen, phosphorous and potassium.
 - (d) all of above.
9. Alkalinity is expressed as milligrams per litre of-
- (a) calcium carbonate
 - (b) sodium hydroxide
 - (c) sulphuric acid
 - (d) none of above
10. NTU is unit used in measurement of-
- (a) acidity
 - (b) alkalinity
 - (c) turbidity
 - (d) none of above
11. Particulate matter of soil in increasing size-
- (a) clay, silt, sand, gravel, boulders.
 - (b) boulders, gravel, sand, silt, clay.
 - (c) gravel, boulder, sand, silt, clay.
 - (d) clay, silt, sand, boulders, gravel.
12. Molecular formula for PAN is-
- (a) RCO_3NO_2
 - (b) RCO_2NO_2
 - (c) RCO_3NO_3
 - (d) None of above
13. Rain water is slightly acidic due to-
- (a) carbonic acid
 - (b) sulphuric acid
 - (c) nitric acid
 - (d) none of above
14. Acid rain is due to-
- (a) carbon dioxide
 - (b) sulphur dioxide
 - (c) CFC
 - (d) nitrogen
15. Which one is a soil macronutrient?
- (a) U
 - (b) Mo
 - (c) K
 - (d) Ni
16. XRD is used for-
- (a) mineralogical analysis of solid materials.
 - (b) measurement of molecular weight distribution.
 - (c) imaging and elemental analysis of small areas of solid materials.
 - (d) all of above.
17. Primary standards should have the property-
- (a) Stability in air and dissolves readily to produce stable solutions in solvent of choice.
 - (b) Cheap and high purity.
 - (c) both (a) and (b)
 - (d) None of above.

18. Technique used for separation and determination of volatile compounds-

- (a) Gas chromatography (b) Spectrophotometry
(c) HPLC (d) None of above

19. The maximum value of quantum yield is-

- (a) 1 (b) 10 (c) 100 (d) infinity

20. Chlorine dioxide is used in the industry in which of the following forms?

- (a) Oxidant (b) Reductant
(c) Bleaching agent (d) Washing agent
