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63/2 (SEM-3) CHM 303

2022

(Held in 2023)

CHEMISTRY

(Theory Paper)

Paper Code : CHM-303

(Environmental Chemistry)

Full Marks – 80

Pass Marks – 32

Time – Three hours

The figures in the margin indicate full marks.
for the questions.

1. Choose the correct options from the following questions : 1×4=4

(a) The boiling point of MIC is

(i) 38.9

(ii) 39.2

(iii) 39.1

(iv) 38.1

(b) The average salinity of the sea water is
_____ parts per thousand.

(i) 26

(ii) 36

(iii) 50

(iv) 60

[Turn over

(c) What does ΔS represent in the expression $P-E-T-R_o = \Delta S$?

(i) Change in surface area

(ii) Change in entropy

(iii) Change in storage

(iv) Change in surface water

(d) Where in the environment is phosphorus mostly found ?

(i) Rocks

(ii) Water

(iii) Atmosphere

(iv) Soil.

2. Answer the following questions :

(a) What do you mean by chemical processes in the environment ? 2

(b) Define water flux. What is the value of total inward and outward flux in the water cycle ? 2

(c) What is meant by the anthropogenic effect ? Discuss nuclear power plant accident that occurred at Chernobyl, USSR in 1986. 4

3. Answer the following questions :

(a) How does the temperature vary in different layers of the atmosphere ? Explain. 5

Or

Discuss the role of free radicals in atmospheric chemistry. 5

(b) Define relative instantaneous radiative forcing and global warming potential. 2

(c) What is PAN ? How are they produced ? 3

(d) What is meant by DPM ? How are they divided ? 3

(e) Discuss about day-time and night-time production of HNO_3 in the atmosphere. 4

(f) Describe the SONOX process for the removal of sulphur and nitrogen precursors. 3

(g) Discuss the Arctic haze atmospheric pollution. 3

(h) Discuss the role of CO_2 as a major contributor to Greenhouse warming ? 5

4. Answer any *five* of the following questions :

5×5=25

- (a) What is meant by polluted water ? What are the major groups of surface water pollutants ? Why are organic water pollutants called DO demanding pollutants ?

1+2+2=5

- (b) Explain how the metal ion mobility in water bodies is influenced by the humic materials.

5

- (c) What are the humic materials ? How are these formed ? Discuss the salient points of any of the two prevalent hypotheses on its formation.

1+1+3=5

- (d) Discuss with suitable examples the reaction between humic materials and organic molecules of anthropogenic origin.

5

- (e) What are the basic features of the structure of humic materials ? Explain how the humic materials entrap a purely covalent compound like DDT ?

3+2=5

- (f) Write short notes on any *two* : $2\frac{1}{2}\times 2=5$

(i) Zonation of large water bodies

(ii) O_2 sag curve and diurnal variation of DO

(iii) Role of clay minerals in the environment.

5. Answer any *three* of the following questions :

- (a) Define soil. Write briefly about composition of soil. What is humus ?

1+3+1=5

- (b) What is chemical weathering of soil ? Write briefly about the different steps of chemical weathering of soil.

1+4=5

- (c) Write short notes on any *two* : $2\frac{1}{2}\times 2=5$

(i) Soil air

(ii) Acid mine drainage

(iii) Soil texture.

- (d) What is incineration of waste ? What are the four incineration technologies applied ?

3+2=5