

Full Marks: 70

Time: 3 Hours.

The candidates are required to give their answer in their own words as far as practicable.

The figures in margin indicate full marks.

Answer five questions in which Q. No. 1 is compulsory.

1. Choose the correct answer of the following: 1 X 10 = 10

(a) The existence of ozone ~~layer~~ belt around the earth is mainly responsible for filtering out

- (i) IR radiation (ii) UV radiation.
(iii) Micro waves (iv) Cosmic rays

(b) All nuclear reactors rely on

- (i) Tritium (ii) Thorium (iii) Radium
(iv) Uranium as fuel.

(c) Toxic chemicals are

- (i) Effective enzyme inhibitors
(ii) Antibody inhibitors.
(iii) Hormone inhibitors.
(iv) Antigens

(d) The concept of green chemistry was coined by

- (i) Komiya (ii) Paul Anastas (iii) Menzies
(iv) None of the above.

(e) Pesticides enter in man through

- (i) Human food chain
- (ii) Birds
- (iii) Insects
- (iv) Animals

(f) The maximum global warming potential is of

- (i) CFC (ii) C_2H_6 (iii) CO_2 (iv) N_2O

(g) Air temperature in troposphere decreases with height at the rate of

- (i) $5.5^\circ C$ per km (ii) $7.5^\circ C$ per km.
- (iii) $4.5^\circ C$ per km (iv) $6.5^\circ C$ per km

(h) A desirable green solvent should be

- (i) Costly (ii) Readily available
- (iii) Toxic (iv) Synthetic

(i) The _____ reactions involve reorganisation of the atoms of the molecules

- (i) Addition reactions
- (ii) Rearrangement
- (iii) Elimination reactions
- (iv) None.

(j) Which of the following wastes often have higher BOD values than COD values.

- (i) Textile wastes
- (ii) Distillery wastes
- (iii) Refinery wastes
- (iv) (ii) and (iii) both

2. (a) Define environment. How is it divided?
Discuss about the vertical stability of the atmosphere. (8)
- (b) Show how temperature inversion takes place in the atmosphere with increase in altitude. (4)
3. (a) Discuss about the chemical solutions to environmental problems. (8)
- (b) Give a list of toxic chemicals in the environment. Indicate their sources and toxic action. (4)
4. (a) What are ^{the} major sources of air pollution? How are the pollutants classified? Describe primary and secondary photochemical reactions in the atmosphere. $4+4+7=15$
5. (a) What is the average composition of sea water? How does it differ from that of sea water? (8)
- (b) Why is the pH of sea water constant at 8.1 ± 0.2 ? (4)
6. Write short notes on any two of the following: $2 \times 7\frac{1}{2} = 15$
- (a) COD
 - (b) Nuclear power plant—
 - (c) Bhopal Gas tragedy
 - (d) Green House effect.

7. (a) "Green chemistry is sustainable chemistry" Explain the statement.

(8)

(b) what are application of green chemistry?

(4)

8. (a) what is characteristics of microwave heating?

(8)

(b) Discuss objectives of green chemistry

(4)



Dr. G. K. Singh, JCC (CCU)

p-5

SBT-I (M.Sc. chem. Sem; IV)

Paper: CC-09 (RVS & Green chemistry)

Answer key (Objective Q.No. 1)

- Q.No. 1 (a) — (ii)
(b) — (iv)
(c) — (i)
(d) — (ii)
(e) — (i)
(f) — (i)
(g) — (iv)
(h) — (ii)
(i) — (ii)
(j) — (iv)

Full Marks: 70

Time: 3 Hours.

The candidates are required to give their answer in their own words as far as practicable.

The figures in margin indicate full marks.

Answer five questions in which Q. No. 1 is compulsory.

1. Select the correct answer of the following: $1 \times 10 = 10$

(i) The second zone of atmosphere is
(a) Troposphere (b) Mesosphere (c) Stratosphere
(d) Thermosphere.

(ii) Nitrogen is an essential constituent of
(a) chlorophyll (b) RNA (c) DNA
(d) All of the above.

(iii) The maximum global warming potential is of

(a) CFC (b) N_2O (c) CO_2 (d) CH_4

(iv) Which of the following is a constituent of photochemical smog.

(a) N_2O_5 (b) N_2O_3 (c) PAN (d) None

(V) Water is an excellent solvent - because

- (a) It has high dielectric ~~const.~~ constant.
- (b) It is hydrogen bonded
- (c) It is a polar molecule
- (d) All

(VI) Which of the following compounds present in water may cause blue baby syndrome.

- (a) Nitrates (b) Sulphates (c) chlorides.
- (d) None

(VII) Bleaching agents used for pulp bleaching include.

- (a) chlorine (b) chlorine dioxide
- (c) Hydrogen peroxide (d) All

(VIII) Green chemistry is also called -

- (a) Environmental chemistry
- (b) Life chemistry
- (c) Sustainable chemistry
- (d) organic chemistry

(IX) Self thermo regulated systems are called as

- (a) Green Methodologies (b) Green synthesis.
- (c) Green principles (d) Green concepts

(X) Bhopal gas tragedy is a case of

- (a) Nuclear pollution (b) Thermal pollution
- (c) Air pollution (d) Soil pollution.

2. (a) Elucidate the major region of atmosphere and discuss the heat-budget of the atmosphere system. (8)

(b) Elaborate the biogeochemical cycle of nitrogen (7)

3. (a) Discuss the analytical method for measuring BOD, DO and COD. (8)

(b) Discuss briefly aquatic pollution (7)

4. (a) What is Global warming? How are the green house gases responsible for it? (9)

(b) Describe the various methods for treatment of potable water. (6)

5. (a) What were the causes of Bhopal gas tragedy? (7)

(b) What is meant by biodegradability? Illustrate your answer with appropriate examples (8)

6. Write short notes on any two of the following $2 \times 7\frac{1}{2} = 15$

(a) Acid rain

(b) Disposal of waste and their management

(c) Minamata disaster

(d) Composition of atmosphere

7. (a) What is difference between microwave heating and conventional heating? (8)

(b) How ~~is~~ green chemistry ~~is~~ used in every day life? (7)

8. (a) Discuss the twelve principles of green chemistry. (15)

Dr. G. L. Singh, JCC (KV)

SRT-II (M.Sc. Chem. Sem: IV) P-5

Paper: CC-09 (Env & Green Chem.)

Answer Key (Objective Q. No-1)

- Q. No. 1
- | | | |
|--------|---|----------------|
| (i) | — | c |
| (ii) | — | d |
| (iii) | — | a |
| (iv) | — | c |
| (v) | — | d |
| (vi) | — | a |
| (vii) | — | a d |
| (viii) | — | c |
| (ix) | — | a |
| (x) | — | c |

SET- II (M.Sc. chem. Sem: IV)

Paper: CC-09 (EVS & Green chemistry)

Full Marks 70

Time: 3 Hours.

The candidates are required to give their answer in their own words, as far as practicable.

The figures in margin indicate full marks.

Answer five questions in which, Q. No. 1 is compulsory.

1. Select the correct answer ~~of~~ out of given alternatives for each question:

(i) The troposphere contains approximately 1×10^{-10} by mass of the entire atmosphere

- (a) 20-30% (b) 30-40% (c) 50-70%
(d) 80-85%

(ii) Which among the following is considered as secondary pollutant.

- (a) Nitrous oxide (b) Carbon monoxide
(c) Ozone (d) None

(iii) The chemical formula of high test hypochlorite is

- (a) HOCl (b) CaOCl_2 (c) $\text{Ca}(\text{OCl})_2$
(d) BaOCl_2

(iv) Which of the following compounds are narcotic in nature

- (a) Chloroform
- (b) Halogenated hydrocarbons
- (c) Ethyl ether
- (d) ~~All~~ All of the above

(v) Chernobyl world's worst nuclear disaster occurred on

- (a) March 25, 1986
- (b) May 25, 1986
- (c) April 25, 1986
- (d) June 25, 1986

(vi) pH of sea water is

- (a) 8.1 (b) 7.5 (c) 4.3 (d) 12.4

(vii) Carbogen is a mixture of

- (a) O_2 and CO_2 (b) O_2 and CO
- (c) O_2 and Cl_2 (d) O_2 and He

(viii) An ideal solvent facilitates the

- (a) Dissolving property
- (b) mass transfer
- (c) combustion
- (d) Titration

(ix) _____ are greener than conventional methods

- (a) microwaves (b) Electromagnetic waves
- (c) Ultraviolet waves (d) Radio waves

(x) Exposure of heavy metals to the human body can be through

- (a) Ingestion (b) Inhalation (c) Skin (d) All

2. (a) What is environmental chemistry? Discuss its social relevance. (8)
- (b) What is ^{the} heat budget of the earth's atmosphere? (7)
3. (a) Mention the important requisites of drinking water. (6)
- (b) Discuss the role of agricultural and industrial wastes in water pollution. What methods you suggest to check it? (9)
4. (a) Discuss ozone hole and its effect on human health. (7)
- (b) What are particles? Discuss their role in the atmosphere. How are organic particulate matter formed in the atmosphere? (8)
5. (a) What is meant by biodegradability? Illustrate your answers with appropriate examples. (7)
- (b) List the nature of effluents in the sugar and distillery units. (8)
6. Write short notes on any two of the following:
- (a) BOD
 - (b) Chernobyl
 - (c) Biogeochemical cycle of nitrogen
 - (d) Global warming.

p-4
7. (a) What is Green chemistry?
Discuss its important principles.
 $6+9=15$

8. (a) Write a comparative statement
on green chemistry and synthetic
chemistry. (4)

(b) What are microwave and how
they work? (8)

Dr. G. W. Singh, JLL (KVV)

SET-III (M.Sc. Chem. Sem: IV) p-5

Paper: CC-09 (RVS & Green Chem.)

Answer Key (Objective & Short)

- Q. No-1 (i) ——— (d)
(ii) ——— (c)
(iii) ——— (c)
(iv) ——— (d)
(v) ——— (c)
(vi) ——— (a)
(vii) ——— (a)
(viii) ——— (b)
(ix) ——— (a)
(x) ——— (d)