



Roll No.	
Name	
Class & Section	

APEEJAY COMMON ANNUAL EXAMINATION, 2019-20

CHEMISTRY

Time Allowed : 3.00 Hrs.

Class – XI

Maximum Marks : 70

General Instructions :

- This question paper contains 37 Questions.*
- All questions are compulsory.*
- Section A contains 20 questions of one mark,
Section B contains 7 questions of two marks,
Section C contains 7 questions of three marks,
Section D contains 3 questions of five marks each.*
- Section A comprises of MCQs, Assertion-Reason Questions and Very Short Answer Questions. These questions are to be answered in one word, one sentence or as per the exact requirement of the question.*
- There is no overall choice. However, an internal choice has been provided in 2 questions of one mark, 2 questions of two marks, 4 questions of three marks and all the 3 questions of five marks.*
- Use of calculators is not permitted. You may use logarithmic tables if required.*

Section-A

Read the given passage and answer the questions 1 to 5 that follow :

The periodic table houses a few families and group of elements, each having its own particular properties. Early p-block comprises of group 13 and 14. Group 13 consists of B, Al, Ga, In, Tl with general configuration ns^2np^1 . Group 14 is Carbon family and comprises of C, Si, Ge, Sn, Pb with general configuration ns^2np^2 . Boron and carbon family form versatile compounds. Boric acid is used as an antiseptic for eyes whereas zeolites are shape selective catalysts.

1. What happens when boric acid is heated above 370K? 1
2. Name a zeolite which is used to convert alcohols directly into gasoline. 1
3. Draw the structure of Diborane. 1
4. What happens when diborane reacts with ammonia? 1
5. Why is $PbCl_2$ more stable than $PbCl_4$? 1

Questions 6 to 10 are one word answers :

6. 1 litre of a gas weighs 1.964 g at STP. What is its molecular mass? 1
7. Amongst ClF_3 or BCl_3 , which molecule has bond angle 120° . 1

OR

Based on VSEPR theory, total number of 90° bond angles present in the molecule of SF_4 are

8. The Vander waal's constant 'a' for different gases are given below : 1

Gas	a (atm L ⁻² mol ⁻² .)
O ₂	1.36
N ₂	1.39
CH ₄	2.25
NH ₃	4.17

Which gas can be most easily liquified?

9. Water is a liquid whereas H_2S is a gas. Give reason. 1
10. Algae reduce dissolved oxygen in water. This process is called 1

Questions 11 to 15 are multiple choice questions :

11. Which of the following pairs of *d* orbitals have electron density along the axis? 1
 - (a) d_{z^2}, d_{xz}
 - (b) d_{yz}, d_{xz}
 - (c) $d_{z^2}, d_{x^2-y^2}$
 - (d) $d_{zy}, d_{x^2-y^2}$
12. In second period of periodic table, first ionization enthalpy follows the order. 1
 - (a) $Ne > F > O > N > C > Be > B > Li$
 - (b) $Ne > F > N > C > O > Be > B > Li$

- (c) $\text{Li} > \text{B} > \text{Be} > \text{C} > \text{O} > \text{N} > \text{F} > \text{Ne}$
- (d) $\text{Ne} > \text{F} > \text{N} > \text{O} > \text{C} > \text{Be} > \text{B} > \text{Li}$
13. In which of the following reactions, the equilibrium remains unaffected on addition of small amount of argon at constant volume? 1
- (a) $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2 \text{HI}(\text{g})$
- (b) $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$
- (c) $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g})$
- (d) The equilibrium will remain unaffected in all the three cases.
14. Standard electrode potential of three metals A, B and C are -1.3 V , $+0.8 \text{ V}$ and -2.8 V respectively. The reducing power of these metals will be- 1
- (a) $\text{A} > \text{B} > \text{C}$ (b) $\text{C} > \text{A} > \text{B}$
- (c) $\text{C} > \text{B} > \text{A}$ (d) $\text{B} > \text{C} > \text{A}$
15. CO_2 is released most readily on heating which of the following? 1
- (a) MgCO_3 (b) CaCO_3
- (c) K_2CO_3 (d) Na_2CO_3

OR

Which of the following has lowest melting point?

- (a) CaCl_2 (b) CaBr_2 1
- (c) CaI_2 (d) CaF_2

Questions 16 to 20

- (a) Both assertion and reason are correct statements and reason is the correct explanation of the assertion.
- (b) Both assertion and reason are correct statements, but reason is not correct explanation of the assertion.
- (c) Assertion is correct, but reason is wrong statement.
- (d) Assertion is wrong, but reason is correct statement.

16. **Assertion :** Liquids tend to have maximum number of molecules at their surface. 1

Reason : Small liquid drops have spherical shape.

17. **Assertion :** One atomic mass unit is defined as one twelfth of the mass of one carbon -12 atom. 1
Reason : Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as standard. 1
18. **Assertion :** A liquid crystallizes into a solid and is accompanied by decrease in entropy. 1
Reason : In crystals, molecules organize in an ordered manner. 1
19. **Assertion :** Permanent hardness of water cannot be removed by treatment with washing soda. 1
Reason : Washing soda reacts with soluble magnesium and calcium sulphate to form insoluble carbonates. 1
20. **Assertion :** Among isomeric pentanes, neopentane has least boiling point. 1
Reason : With an increase in branching, boiling point decreases. 1

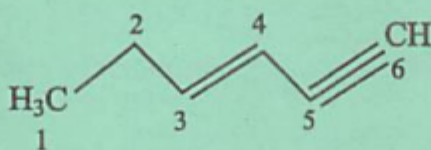
Section-B

21. In the estimation of sulphur by Carius method, 0.468 g of an organic compound gives 0.668g of barium sulphate. Find the percentage of sulphur in the given compound. 2
 [At mass; Ba = 137 u, S = 32 u, O = 16 u]
22. Calculate the energy associated with the first orbit of He^+ . What is the radius of this orbit? 2

OR

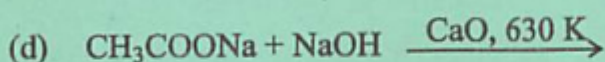
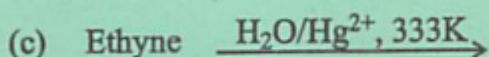
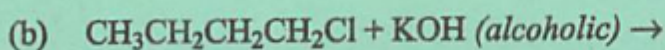
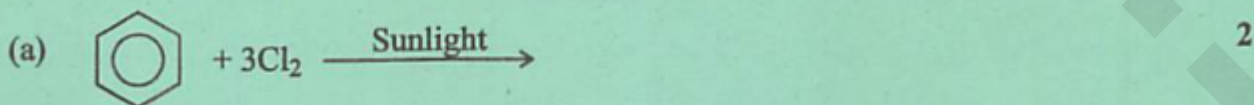
An electron has speed of 40 m sec^{-1} accurate upto 99.99%. What is uncertainty in locating its position? (Mass of electron = $9.1 \times 10^{-31} \text{ kg}$, velocity of electron = 300 ms^{-1} , $h = 6.626 \times 10^{-34} \text{ kg m}^2 \text{ s}^{-1}$)

23. How is hydrogen peroxide prepared industrially? Explain why it is stored in wax-lined glass or plastic bottles? 2
24. Balance the equation : 2
 $\text{Cr}_2\text{O}_7^{2-} + \text{I}^- \rightarrow \text{Cr}^{3+} + \text{I}_2$ (in acidic medium)
25. What is BOD? If the value of BOD is low, what does it indicate? 2
26. Write the IUPAC name of the following :



- (a) Out of the 1st, 3rd and 5th carbon atom, which is most acidic? Why? 2
- (b) How many sigma bonds are there in this compound?

27. Predict the products in the following reactions :



OR

Give complete balanced chemical equations for the following reactions : 2

- (a) Wurtz reaction,
 (b) Friedel Craft Acylation

Section-C

28. (a) Which is smaller in size- Fe²⁺ or Fe³⁺? Why? 3
 (b) Write the general electronic configuration of f block elements.
 (c) Write the IUPAC name and symbol of element with atomic number 117.
29. A compound on analysis found to contain following percentage composition Na = 43.4%, C = 11.3 %, and O = 45.3%. Determine the empirical and molecular formulae of this compound. The relative molecular mass of the compound is 106. (Atomic Mass of Na = 23, C = 12, O = 16) 3

OR

Commercially available Hydrochloric acid contains 38% HCl by mass.

- (a) What is the molarity and molality of the solution if the density of the solution is 1.19 g/cc? 3
 (b) What volume of concentrated HCl is needed to make 1 L of 0.2 M HCl solution?
30. Give the reactions involved in the Solvay's process for the preparation of sodium carbonate. 3

OR

- (a) Draw the structures of - 3
 (i) BeCl_2 (vapour) (ii) BeCl_2 (solid)

(b) Why are alkali metals strong reducing agents?

31. (a) An organic compound decomposes before attaining its boiling point. As this compound cannot be separated and purified by using simple distillation, suggest the method that can be used for its purification.

(b) What are free radicals? Discuss the stability of primary, secondary and tertiary free radicals. 3

32. (a) What will be the volume of hydrogen when 3 litres of it are cooled from 15°C to -73°C at constant pressure. 3

(b) What is Critical temperature?

OR

(a) Compare graph of P vs. V for real and an ideal gas.

(b) What will be the pressure exerted by a mixture of 3.2g of methane and 4.4g of carbon dioxide at 9dm^3 flask at 27°C ? ($R=0.082\text{ L atm K}^{-1}\text{ mol}^{-1}$) 3

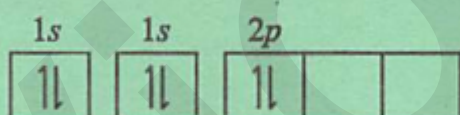
33. (a) Using s, p, d, f notations, describe the orbital with the following quantum number values :

(i) $n=4; l=0$

(ii) $n=3; l=2$

(b) Calculate de Broglie wavelength of an electron moving with 1% the speed of light.

(c) Which rule is violated in the following orbital diagram? 3



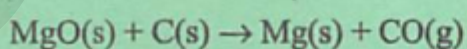
34. (a) Calculate the energy required to raise the temperature of 10 g of iron from 25°C to 500°C . (the specific heat capacity of iron is $0.45\text{ J }^\circ\text{C}^{-1}\text{ g}^{-1}$.)

(b) What mass of gold (specific heat capacity = $0.13\text{ J }^\circ\text{C}^{-1}\text{ g}^{-1}$) can be heated through the same temperature difference when supplied with the same amount of energy? 3

OR

(a) State the Third Law of Thermodynamics.

(b) Calculate and find whether it is possible to reduce MgO using carbon at 298 K.



3

evidyarthi