Reg. No. :

FY-25

Name :

FIRST YEAR HIGHER SECONDARY EXAMINATION, MARCH 2020

Part – III

CHEMISTRY

Maximum : 60 Scores

Time : 2 Hours

Cool-off time : 15 Minutes

General Instructions to Candidates :

- There is a 'Cool-off time' of 15 minutes in addition to the writing time.
- Use the 'Cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

Answer any 7 questions from 1 to 9. Each carries 1 score. **(7 × 1 = 7)**

1. Water gas is a mixture of

   (a) $CO + H_2$ (b) $CO + N_2$

   (c) $CO_2 + H_2$ (d) $CO_2 + N_2$

2. The element that has outer electronic configuration $3d^5 4s^1$ belongs to

   (a) s-block (b) p-block

   (c) d-block (d) f-block

3. The number of radial nodes of 4p orbital is

   (a) 1 (b) 2

   (c) 3 (d) 4

4. The species that can form both conjugate acid and conjugate base among the following is

   (a) H_2O (b) BF_3

   (c) HC*l* (d) CO_2

5. Liquids having large difference in boiling points are separated by

   (a) Distillation (b) Fractional distillation

   (c) Steam distillation (d) Vacuum distillation

6. The oxidation number of an atom in the elementary form is _____.

7. The unit of coefficient of viscosity in c.g.s. system is _____.

8. The class of organic compound differ by a $\diagdown\!\!\diagup CH_2$ group between adjacent members are called _____.

9. The combination of smoke and fog is known as _____.

Answer any 10 questions from 10 to 22. Each carries 2 scores. **(10 × 2 = 20)**

10. (a) Classify the following matter as homogeneous mixture, heterogeneous mixture, element and compounds.

gold, air, muddy water, water **(1)**

(b) Define limiting reagent of a reaction. **(1)**

11. Write any two characteristic properties of canal rays. **(2)**

12. (a) Identify the group and period of an element having atomic number (Z) 25 in the periodic table. **(1)**

(b) Predict the formula of the stable binary compound that would be formed by the combination of the following pairs of elements ; **(1)**

(i) Lithium and oxygen

(ii) Aluminium and iodine.

13. Explain the general periodic trend of first ionization enthalpy along a period and group in the periodic table. **(2)**

14. A gas occupy 400 ml volume at 47 °C and 800 mm of Hg pressure. What will be its pressure at a height where the temperature is 27 °C and volume of the gas is 450 ml ? **(2)**

15. Define extensive and intensive properties. Give examples for each. **(2)**

16. Derive the relation between equilibrium constants K_c and K_p for a general reaction $aA + bB \rightleftharpoons cC + dD$ at equilibrium. **(2)**

17. (a) What are saline hydrides ? **(1)**

(b) Why hard water is unsuitable for laundry purpose ? **(1)**

18. List any two points of difference between Lithium and other alkali metals. Give reasons. **(2)**

19. (a) What is borone bead test ? **(1)**

(b) $SiCl_4$ can be hydrolysed but CCl_4 cannot. Why ? **(1)**

20. (a) Why $AlCl_3$ exist as dimers ? **(1)**

(b) Write the basic structural unit of silicons and silicates. **(1)**

21. Give the complete and bondline structure of pent-4-en-2-ol. **(2)**

22. Draw the Newman projections for staggered and eclipsed conformations of ethane. **(2)**

Answer any 7 questions from 23 to 31. Each carries 3 scores. **(7 × 3 = 21)**

23. (a) Hydrogen and oxygen combines to form H_2O and H_2O_2. Which law of chemical combination is illustrated here ? **(1)**

(b) The balanced chemical equation for combustion of CH_4 is

$CH_4(g) + 2O_2(g) \rightarrow CO_{2(g)} + 2H_2O_{(l)}$

Calculate the amount of water formed by the combustion of 32g of CH_4 ? **(2)**

24. (a) Give two examples of compounds having expanded octet. **(1)**

(b) Draw the Lewis dot symbols of **(2)**

(i) Cl_2

(ii) NF_3

25. (a) Write the name of van der Waal's force between **(1)**

(i) Non-polar molecules

(ii) Molecules having permanent dipoles.

(b) State Dalton's law of partial pressures. **(1)**

(c) At higher altitudes, pressure cooker is used for cooking. Give reason. **(1)**

26. (a) Write the mathematical expression of First Law of thermodynamics. **(1)**

(b) Define standard enthalpy of formation. **(1)**

(c) Write the condition of temperature for a process to be spontaneous whose ΔH and ΔS values are positive. **(1)**

[Hint : $\Delta G = \Delta H - T\Delta S$]

27. (a) Justify that the following reaction is a redox reaction

$H_2S_{(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)} + S_{(s)}$ **(2)**

(b) Write the Stock notation of MnO_2. **(1)**

28. (a) What is calogen ? **(1)**

(b) Explain the methods used for the removal of temporary hardness of water. **(2)**

29. (a) What is the purpose of adding gypsum during the manufacture of cement ? **(1)**

(b) Match the following : **(2)**

Common Name	Chemical Formula
Washing Soda	NaCl
Caustic Soda	$CaSO_4 \cdot \frac{1}{2} H_2O$
Quick lime	Na_2CO_3
Plaster of Paris	CaO
	NaOH

30. (a) What is Lindlar's catalyst ? **(½)**

(b) Identify A, B and C.

$$CH_3 - CH = CH_2 + O_3 \rightarrow A \xrightarrow[H_2O]{Zn} B + C.$$ **(1½)**

(c) Complete the reaction.

 $+ Cl_2 \xrightarrow{\text{anhydrous } AlCl_3}$ _____ **(1)**

31. Define the Following terms :

(a) Freons

(b) BOD

(c) Green house effect

Answer any 3 questions from 32 to 35. Each carries 4 scores. **(3 × 4 = 12)**

32. (a) Write the n and *l* values of a 4d electron. **(1)**

(b) Give the names of series of spectral lines of atomic hydrogen and their region in the electromagnetic spectrum. **(2)**

(c) State Hund's rule of maximum multiplicity. **(1)**

33. (a) Predict the hybridisation of phosphorous atom in PCl_5 molecule. **(1)**

(b) Account for the high reactivity of PCl_5 molecule. **(1)**

(c) Draw the MO energy level diagram of O_2 molecule. **(2)**

34. (a) Predict the nature of solution produced by the hydrolysis of sodium acetate. **(1)**

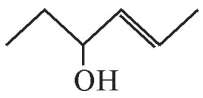
(b) Calculate the pH of a solution having H^+ ion concentration 3.8×10^{-3} m. **(2)**

(c) Explain the effect of pressure in the following equilibrium using Le Chatelier principle :

$CO_{(g)} + 3H_{2(g)} \rightleftharpoons CH_{4(g)} + H_2O_{(g)}$ **(1)**

35. (a) Write the IUPAC name of **(2)**

(i) $CH_3 - \underset{\displaystyle Cl}{\underset{|}{CH}} - CH_2 - COOH$

(ii) 

(b) Write the functional isomers of molecule having molecular formula C_3H_6O. **(1)**

(c) How will you detect the presence of chlorine in an organic compound using Lassaigne's test ? **(1)**
