



# Entry Test

Academic Session 2019-20

**CHEMISTRY**

Total Marks **40**

45 min

Class: IG-III(X)

**Write in block letters:**

Candidate Name

Date

**Kindly read the instructions carefully;**

- 1 Answers must be written in ink.
- 2 Write the number of question distinctly before each answer.

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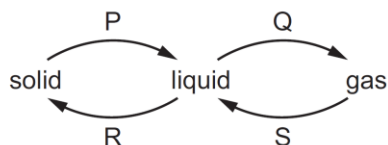
Total Marks		Marks Obtained		Percentage	

## Section A – Multiple Choice Questions (MCQs)

1 Which molecule contains exactly two single covalent bonds?

- A**  $Cl_2$                       **B**  $CH_4$                       **C**  $H_2O$                       **D**  $HCl$

2 The diagram shows some changes of state.



Which words describe the changes of state, P, Q, R and S?

	P	Q	R	S
<b>A</b>	freezing	boiling	melting	evaporation
<b>B</b>	melting	evaporation	freezing	condensation
<b>C</b>	melting	sublimation	freezing	evaporation
<b>D</b>	sublimation	evaporation	melting	condensation

3 Sodium reacts with chlorine to form sodium chloride.

Which statements describe what happens to the sodium atoms in this reaction?

- 1 Sodium atoms form positive ions.
- 2 Sodium atoms form negative ions.
- 3 Sodium atoms gain electrons.
- 4 Sodium atoms lose electrons.

- A** 1 and 3                      **B** 1 and 4                      **C** 2 and 3                      **D** 2 and 4

4 What is the relative formula mass of ammonium nitrate,  $NH_4NO_3$ ?

- A** 80                      **B** 108                      **C** 122                      **D** 150

5 Four statements about the arrangement of particles are given.

- 1 Particles are packed in a regular arrangement.
- 2 Particles are randomly arranged.
- 3 Particles move over each other.
- 4 Particles vibrate about fixed points.

Which statements describe the particles in a solid?

- A** 1 and 3                      **B** 1 and 4                      **C** 2 and 3                      **D** 2 and 4

- 6 Q and R are elements in the same period of the Periodic Table.

Q has 7 electrons in its outer shell and R has 2 electrons in its outer shell.

Which statement about Q and R is correct?

- A** Q is a metal and R is a non-metal.  
**B** Q and R have different numbers of electron shells.  
**C** R is found to the right of Q in the Periodic Table.  
**D** The proton number of R is less than the proton number of Q.
- 7 Which electron arrangement for the outer shell electrons in a covalent compound is correct?

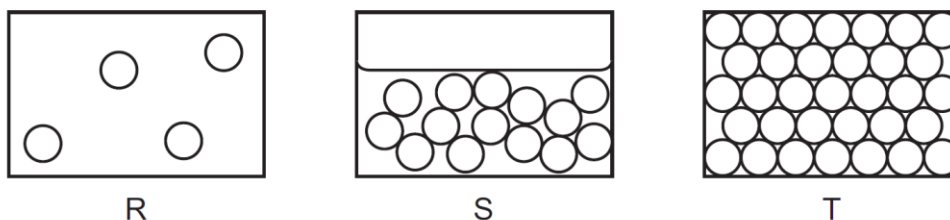


- 8 Which element does **not** form a stable ion with the same electronic structure as argon?
- A** aluminium  
**B** chlorine  
**C** phosphorus  
**D** potassium
- 9 Graphite and diamond are both forms of the element carbon.

Which row shows the number of other carbon atoms that each carbon atom is covalently bonded to in graphite and diamond?

	graphite	diamond
<b>A</b>	3	3
<b>B</b>	3	4
<b>C</b>	4	3
<b>D</b>	4	4

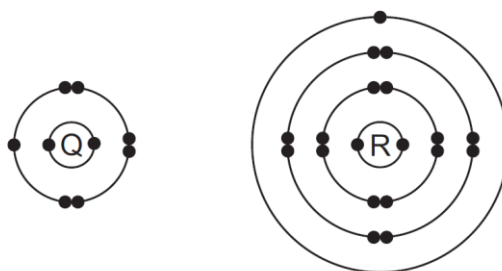
- 10 Diagrams R, S and T represent the three states of matter.



Which change occurs during freezing?

- A** R → S                      **B** S → T                      **C** T → R                      **D** T → S

- 11 A student needs to measure  $22 \text{ cm}^3$  of water at  $40^\circ\text{C}$ .  
Which apparatus is required?
- A** beaker and stopwatch  
**B** beaker and thermometer  
**C** measuring cylinder and stopwatch  
**D** measuring cylinder and thermometer
- 12 Which method is used to obtain a concentrated solution of ethanol from a dilute solution of ethanol dissolved in water?
- A** crystallisation  
**B** distillation  
**C** filtration  
**D** paper chromatography
- 13 Which definition of isotopes is correct?
- A** atoms of the same element that have the same number of electrons and nucleons  
**B** atoms of the same element that have the same number of neutrons and protons  
**C** atoms of the same element that have the same number of protons but a different number of electrons  
**D** atoms of the same element that have the same number of protons but a different number of nucleons
- 14 The electronic structures of atoms Q and R are shown.



Q and R form an ionic compound.

What is the formula of the compound?

- A**  $\text{QR}_7$       **B**  $\text{Q}_2\text{R}_4$       **C**  $\text{QR}$       **D**  $\text{Q}_7\text{R}$
- 15 Which two gases each give the same result for the test shown?

	test	gas 1	gas 2
<b>A</b>	damp blue litmus paper	ammonia	chlorine
<b>B</b>	damp blue litmus paper	ammonia	oxygen
<b>C</b>	lighted splint	hydrogen	chlorine
<b>D</b>	lighted splint	hydrogen	oxygen

- 16 Which statement about oxides is correct?
- A A solution of magnesium oxide has a pH less than pH 7.
  - B A solution of sulfur dioxide has a pH greater than pH 7.
  - C Magnesium oxide reacts with nitric acid to make a salt.
  - D Sulfur dioxide reacts with hydrochloric acid to make a salt.
- 17 Which methods are suitable for preparing **both** zinc sulfate and copper(II) sulfate?
- 1 reacting the metal oxide with warm dilute aqueous sulfuric acid
  - 2 reacting the metal with dilute aqueous sulfuric acid
  - 3 reacting the metal carbonate with dilute aqueous sulfuric acid
- A 1, 2 and 3    B 1 and 2 only    C 1 and 3 only    D 2 and 3 only
- 18 Two separate tests are done on separate solutions of compound X.
- 1 Addition of aqueous sodium hydroxide forms a green precipitate that dissolves in an excess of aqueous sodium hydroxide.
  - 2 Addition of dilute nitric acid and aqueous silver nitrate forms a white precipitate.

What is compound X?

- A chromium(III) carbonate
  - B chromium(III) chloride
  - C iron(II) carbonate
  - D iron(II) chloride
- 19 Which statement about the Periodic Table is correct?
- A Elements in the same group have the same number of electron shells.
  - B It contains elements arranged in order of increasing proton number.
  - C Metals are on the right and non-metals are on the left.
  - D The most reactive elements are at the bottom of every group.
- 20 Chlorine, bromine and iodine are elements in Group VII of the Periodic Table.

Which statement about these elements is **not** correct?

- A The colour gets darker down the group.
- B The density increases down the group.
- C They are all gases at room temperature and pressure.
- D They are all non-metals.

## Section B –Structure Questions

- 1 Flerovium, *Fl*, atomic number 114, was first made in research laboratories in 1998.
- (a) Flerovium was made by bombarding atoms of plutonium, Pu, atomic number 94, with atoms of element Z.
- The nucleus of **one** atom of plutonium combined with the nucleus of **one** atom of element Z.
  - This formed the nucleus of **one** atom of flerovium.

Suggest the identity of element Z.

..... [1]

- (b) In which period of the Periodic Table is flerovium?

..... [1]

- (c) Predict the number of outer shell electrons in an atom of flerovium.

..... [1]

- (d) Two isotopes of flerovium are  $^{286}\text{Fl}$  and  $^{289}\text{Fl}$ . The nuclei of both of these isotopes are unstable and emit energy when they split up.

- (i) State the term used to describe isotopes with unstable nuclei.

..... [1]

- (ii) Complete the table to show the number of protons, neutrons and electrons in the atoms of the isotopes shown.

isotope	number of protons	number of neutrons	number of electrons
$^{286}\text{Fl}$			
$^{289}\text{Fl}$			

[2]

- (e) Only a relatively small number of atoms of flerovium have been made in the laboratory and the properties of flerovium have not yet been investigated.

It has been suggested that flerovium is a typical metal.

- (i) Suggest **two** physical properties of flerovium.

1 .....

2 .....

[2]

- (ii) Suggest **one** chemical property of flerovium oxide.

..... [1]

[Total: 9]

- 2 Many organic compounds, such as alcohols, carboxylic acids and esters, contain the elements carbon, hydrogen and oxygen only.

(a) Compound **R** has the following composition by mass: C, 60.00%; H, 13.33%; O, 26.67%.

Calculate the empirical formula of compound **R**.

empirical formula = ..... [2]

(b) Compound **S** has the empirical formula  $C_2H_4O$  and a relative molecular mass of 88.

Calculate the molecular formula of compound **S**.

molecular formula = ..... [2]

(c) All sodium salts are soluble in water. All nitrates are soluble in water. Barium carbonate is insoluble in water.

Describe how you would make a pure, dry sample of barium carbonate by precipitation.

Include:

- the names of the starting materials
- full practical details
- a chemical equation.

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..... [5]

3 Nickel, copper and zinc are three consecutive elements in the Periodic Table.

(a) Nickel and copper are transition elements.

State **three** chemical properties of transition elements.

.....

.....

..... [2]

[Total: 11]



The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	VIII										
3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	2 He helium 4									
11 Na sodium 23	12 Mg magnesium 24	<b>Key</b> atomic number atomic symbol name relative atomic mass		13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40								
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	114 Fl flerovium —	116 Lv livermorium —	118 Og oganeson —	119 Uue unbinetium —	120 Uub ununbium —	121 Uut ununtrium —
		57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175	72 Hf hafnium 178
		89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —	104 Rf rutherfordium —

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).