The City School

Unified Mid-Year Examinations
2018 - 2019
Class 9

SCHOOL NAME	
INDEX NUMBER	
DATE	

CHEMISTRY
Paper 2 Theory

5070/22
1 hour 30 minutes

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your School name, Index number and Date in the spaces provided.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use paper clips, glue or correction fluid.

Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
A copy of Periodic Table is printed on page 12

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

Invigilated By: _____ Checked By:_____ Marks Tallied By: _____

This document consists of **12** printed pages.

A1 Choose from the following list of metals to answer the questions below.

mercury

iron

lead

magnesium

potassium

silver

vanadium

Each metal can be used once, more than once or not at all.

Which metal

(a) reacts with cold water to form an alkaline solution,

..... [1]

(b) is the only liquid metal at room temperature and pressure.

..... [1]

(c) has variable oxidation state,

..... [1]

(d) is a transition metal

..... [1]

(e) is in Group II and in Period 3 of Periodic Table.

..... [1]

[Total: 5]

A2 Chlorine, bromine and iodine are non-metals in Group VII of the Periodic Table. Their molecules are diatomic.

(a) What do you understand by the term *diatomic*?

..... [1]

(b) Describe the trend in color of the Group VII elements down the Group.

..... [1]

(c) In what physical state do the following elements exist at room temperature and pressure?

Chlorine.....

Bromine.....

Iodine..... [3]

(d) Aqueous bromine reacts with aqueous potassium iodide.

Br_2 (aq) + 2KI (aq) ---------→ 2KBr (aq) + I_2 (aq)

(i) Explain this reaction

.....

..... [2]

(ii) Explain why aqueous bromine does not react with aqueous potassium chloride.

.....

..... [1]

[Total: 8]

A3 The table shows the atomic structure of six particles, represented by the letters L to Q. The particles are atoms or ions. The letters are not the symbols of the elements.

particle	electrons	protons	neutrons
L	6	6	6
M	2	2	2
N	12	12	12
O	10	12	12
P	6	6	8
Q	10	13	14

Use the letters L to Q to answer the following questions.

(a) Which 2 particles are ions?

..... [2]

(b) Which particle is an atom of a noble gas? Explain your answer.

.....

..... [2]

(c) Which 2 particles are an atom and an ion of the same element?

..... [2]

(d) Which 2 particles are isotopes of the same element?

..... [2]

(e) Which particle has the highest atomic mass?

..... [1]

[Total: 9]

A4 Lithium, sodium and potassium are elements in Group I of the Periodic Table. Francium, Fr, is another element in Group I.

(a) How many electrons are in there in the outer shell of a francium atom?

..... [1]

(b) Complete the following table about an atom of francium.

mass number: 223

number of protons .....

number of electrons .....

number of neutrons..... [3]

(c) Predict three physical properties of francium.

1 .....

2 .....

3 ..... [3]

(d) A scientist predicts that sodium reacts violently with water.

Write down any two observations of this reaction.

1 .....

2 ..... [2]

(e) Write any two trends of group 1 elements.

1 .....

2 ..... [2]

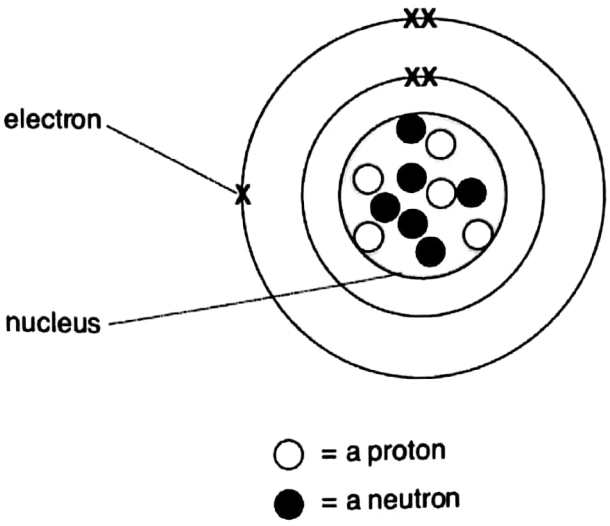
(f) Potassium reacts with water to form alkali and one another product.

Write down the balanced chemical equation.

..... [1]

[Total: 12]

A5 The diagram shows the atomic structure of an atom of element **X**.



(a) Complete the table.

sub-atomic particle	relative charge	relative mass
electron	–1	
neutron		
proton		1

[2]

(b) Carbon-12 has the symbol $^{12}_{6}C$.

Write the symbol for an atom of element **X**.

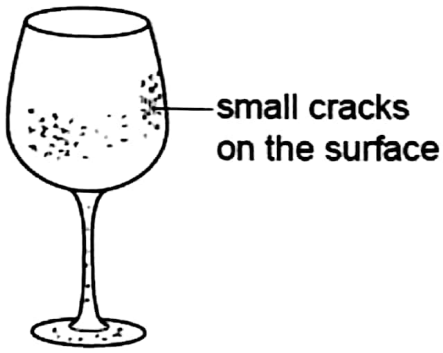
..... [1]

(c) Draw a diagram to show the atomic structure of **another** isotope of element **X**.

[2]

[Total: 5]

A6 Old wine glasses often appear cloudy because they have many small cracks on their surface



The cracks are caused by differences in the rate of diffusion of sodium ions and hydrogen ions in the glass.

(a) Explain the meaning of the term *diffusion*.

.....

.....

..... [1]

(b) Suggest why sodium and hydrogen ions do not diffuse at the same rate.

.....

.....

..... [1]

(c) Describe the effect of temperature and molecular mass on the rate of diffusion.

.....

.....

.....

..... [2]

[Total: 4]

A7 (a) The diagram shows the changes of state when zinc vapour is cooled slowly to room temperature.

Explain what happens during these changes in terms of

- the distance between the particles,
- the type of motion shown by the particles.

.....

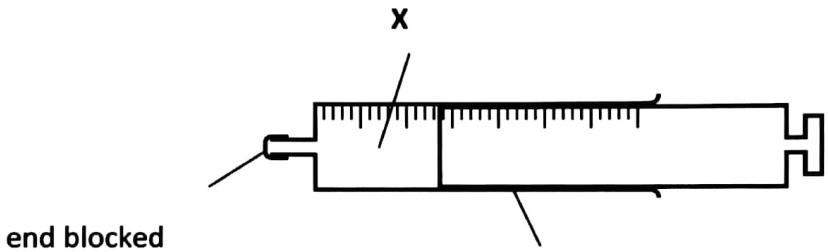
.....

.....

.....

..... [4]

(b) A closed gas syringe contains substance **X**.



gas syringe

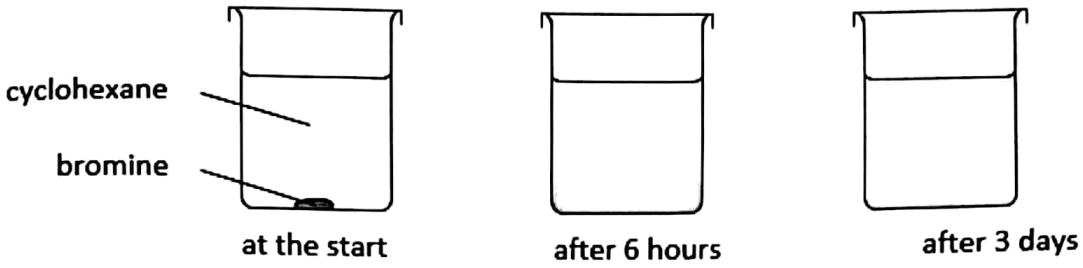
Describe what happens to the volume of substance **X** in the syringe when the pressure is increased. The temperature remains constant. Explain your answer in terms of particles.

.....

..... [2]

(c) Bromine is a red-brown liquid which is soluble in a solvent cyclohexane.

A few drops of liquid bromine were placed at the bottom of a beaker containing cyclohexane. After 3 days, a red-brown color had spread throughout the beaker.



Explain these observations using the kinetic particle model.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 9]

A8 (a) What is meant by the term compound?

.....

..... [1]

(b) Deduce element, compound and mixtures from the following substances:

oxygen gas, O_2	nitrogen gas, N_2	carbon dioxide, CO_2	ammonia, NH_3
air	sea water	helium, He	chlorine gas, Cl_2

Element..... [1]

Compound.....[1]

Mixtures..... [1]

[Total: 4]

A9 Complete the table to show the number of electrons, neutrons and protons in the chlorine atom and bromide ion shown.

	number of electrons	number of neutrons	number of protons
$^{35}_{17}Cl$	17		
$^{79}_{35}Br^{-}$		44	
$^{27}_{13}Al^{+3}$			13
$^{16}_{8}O^{-2}$		8	

[Total: 4]

The Periodic Table of Elements

	Group																	
	I	II									III	IV	V	VI	VII	VIII
																2 He helium 4
						1 H hydrogen 1										
	3 Li lithium 7	4 Be beryllium 9									5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
	11 Na sodium 23	12 Mg magnesium 24									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 –				

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	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
actinoids	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 –

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