



Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCE: CHEMISTRY (P2)

COMMON TEST

MARCH 2018

MARKS: 50

TIME: 1 hour

This question paper consists of 7 pages and a Periodic Table.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FOUR questions. Answer ALL the questions in the ANSWER BOOK.
2. Number the answers correctly according to the numbering system used in this question paper.
3. Leave ONE line between two sub questions, for example between QUESTION 2.1 and QUESTION 2.2.
4. You may use a non-programmable calculator.
5. You may use appropriate mathematical instruments.
6. YOU ARE ADVISED TO USE THE ATTACHED DATA SHEET.
7. Show ALL formulae and substitutions in ALL calculations.
8. Round off your FINAL numerical answers to a minimum to TWO decimal places.
9. Give brief motivations, discussions, et cetera where required.
10. Write neatly and legibly.

QUESTION 1: MULTIPLE- CHOICE

Four options are provided as possible answers to the following questions.
Each question has only ONE correct answer. Write down only the letter (A – D)
next to the question number (1.1 – 1.3) in the answer book, for example 1.5 A.

1.1 Which of the following CANNOT be classified as an element?

- A. Cl_2
- B. H_2O
- C. S
- D. C

(2)

1.2 The measureable tendency of an atom in a molecule attract bonding electrons is called a /an ...

- A. Atomic radii
- B. Electron affinity
- C. Electronegativity
- D. Ionisation

(2)

1.3 What is a specific name given to a substance that has gained electrons?

- A. Ion
- B. Atom
- C. Cation
- D. Anion

(2)

1.4 Which of the following equations represents the first ionization of potassium?

- A. $\text{K(s)} + \text{energy} \rightarrow \text{K}^+(\text{g}) + \text{e}^-$
- B. $\text{K(g)} + \text{e}^- \rightarrow \text{K}^+(\text{g}) + \text{energy}$
- C. $\text{K(g)} + \text{energy} \rightarrow \text{K}^+(\text{g}) + \text{e}^-$
- D. $\text{K(s)} + \text{energy} \rightarrow \text{K}^+(\text{s}) + \text{e}^-$

(2)

[8]

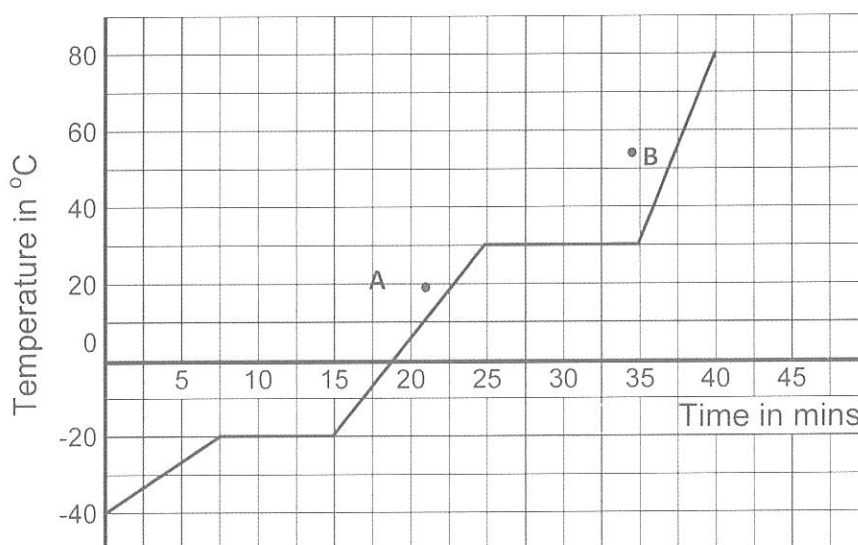
QUESTION 2

2.1 Classify each of the following substances as either a PURE SUBSTANCE or a MIXTURE.

2.1.1 Steel (1)

2.1.2 Iron (1)

2.2 A graph below shows the heating curve of a pure substance under standard pressure.



2.2.1 Define *boiling point*. (2)

2.2.2 What is the melting point of this substance? (1)

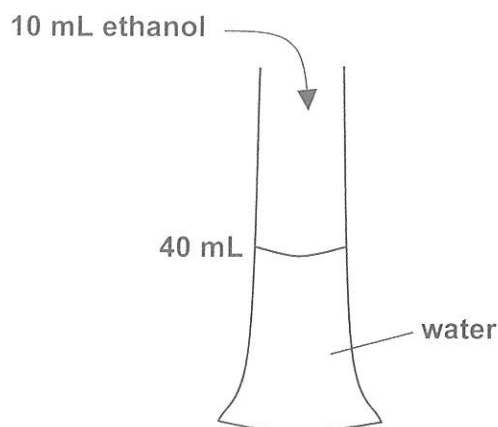
2.2.3 In which phase is this substance at point **A**? Give a reason. (2)

2.2.4 Describe the arrangement of particles at time 5 minutes? (2)

2.2.5 Between 25 and 35 minutes, the graph shows no change in temperature. Explain this observation. (2)

2.2.6 What is the phase of this substance at B? (1)

- 2.3 A learner adds 10 mL of ethanol to a measuring cylinder containing 40 mL of water.



She then stirs the mixture with a glass rod.

- 2.3.1 Is the mixture homogeneous or heterogeneous? Give a reason. (2)

- 2.3.2 The learner notices that the final volume of the liquid in the measuring cylinder is a little less than 50 mL. Explain why this is so. (2)
(NO evaporation took place).

The learner now wishes to separate this mixture in the laboratory.

- 2.3.3 What physical property of the two liquids would she consider when trying to separate the liquids in the mixture? (1)

- 2.3.4 Name the separation technique most suitable to separate these two liquids. (1)

- 2.3.5 What is meant by condensation? (1)
[19]

QUESTION 3

The following table shows the percentage abundance of two isotopes of chlorine.

ISOTOPE	% ABUNDANCE
$^{35}_{17}\text{Cl}$	75.77
$^{37}_{17}\text{Cl}$	24.23

- 3.1 What are isotopes? (1)
- 3.2 How many neutrons are present in an atom of $^{35}_{17}\text{Cl}$? (1)
- 3.3 The average relative atomic mass of chlorine is 35.50 g.mol^{-1} . If the atomic mass number of ^{35}Cl is $34.969 \text{ g.mol}^{-1}$, calculate atomic mass number of ^{35}Cl . (4)
- 3.4 The periodic table is a systematic arrangement of elements based on their physical and chemical properties. Element **X** is found in group 2 and period 3 of the periodic table.
- 3.4.1 Identify element **X** by name. (1)
- 3.4.2 What is the name of the group to which element X belongs? (1)
- 3.4.3 Write down the electronic configuration (sp notation) of element **X**. (2)
- 3.4.4 Element X undergoes ionisation. Write down the name of the element that has the same electronic configuration as element X after ionisation. (2)
- [12]**

QUESTION 4

- 4.1 Define a *covalent bond*. (1)
- 4.2 Draw the Lewis Dot structure for the CO₂ molecule. (2)
- 4.3 Silver is a metal at room temperature
- 4.3.1 Explain briefly why silver is a good conductor of electricity at room temperature. (2)
- 4.3.2 How will the conductivity of silver be affected when it is heated?
(Choose from: INCREASES; DECREASES or REMAINS THE SAME) (1)
- 4.4 Silicon is a metalloid.
- 4.4.1 What is a metalloid? (1)
- 4.4.2 How will the conductivity of silicon be affected when it is heated?
(Choose from: INCREASES; DECREASES or REMAINS THE SAME) (1)
- 4.5 Write down the name of the following compounds.
- 4.5.1 NH₃ (1)
- 4.5.2 MgSO₄ (1)
- 4.6 Write down the formula for aluminium nitrate. (1)
- [11]**

TOTAL MARKS: [50]

TABLE 3: THE PERIODIC TABLE OF ELEMENTS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
(I)	(II)											(III)	(IV)	(V)	(VI)	(VII)	(VIII)
1 2,1 H																	2 He
1																	4
3 1,0 Li	4 5,1 Be																10 Ne
7	9																20
11 0,9 Na	12 2,1 Mg																18
23	24																18 Ar
19 0,8 K	20 0,1 Ca	21 2,1 Sc	22 5,1 Ti	23 6,1 V	24 9,1 Cr	25 5,1 Mn	26 8,1 Fe	27 8,1 Co	28 8,1 Ni	29 6,1 Cu	30 6,1 Zn	31 1,6 Ga	32 1,8 Ge	33 2,0 As	34 2,4 Se	35 2,8 Br	36 Kr
39	40	45	48	51	52	55	56	59	59	63,5	65	70	73	75	79	80	84
37 0,8 Rb	38 0,1 Sr	39 1,2 Y	40 4,1 Zr	41 6,1 Nb	42 8,1 Mo	43 6,1 Tc	44 2,2 Ru	45 2,2 Rh	46 2,2 Pd	47 6,1 Ag	48 1,7 Cd	49 1,7 In	50 1,8 Sn	51 1,9 Sb	52 2,1 Te	53 2,5 I	54 Xe
86	88	89	91	92	96		101	103	106	108	112	115	119	122	128	127	131
55 0,7 Cs	56 6,0 Ba	57 139 La	72 9,1 Hf	73 181 Ta	74 184 W	75 186 Re	76 190 Os	77 192 Ir	78 195 Pt	79 197 Au	80 201 Hg	81 1,8 Tl	82 1,8 Pb	83 1,9 Bi	84 2,0 Po	85 2,5 At	86 Rn
133	137	139	179	181	184	186	190	192	195	197	201	204	207	209			
87 0,7 Fr	88 6,0 Ra	89 226 Ac															

KEY/SLEUTEL

Atomic number →

Electronegativity →

Symbol

Simbool

Approximate relative atomic mass
Benaderde relatiewe atoommassa

29
1,6
Cu

58 140 Ce	59 141 Pr	60 144 Nd	61 Pm	62 150 Sm	63 152 Eu	64 157 Gd	65 159 Tb	66 163 Dy	67 165 Ho	68 167 Er	69 169 Tm	70 173 Yb	71 175 Lu
90 Th	91 91 Pa	92 238 U	93 Np	94 94 Pu	95 95 Am	96 96 Cm	97 97 Bk	98 98 Cf	99 99 Es	100 100 Fm	101 101 Md	102 102 No	103 103 Lr



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MARKING GUIDELINE

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N.B: This marking guideline consists of 4 pages.

SECTION A

QUESTION 1

- 1.1 B ✓✓ (2)
1.2 C ✓✓ (2)
1.3 D ✓✓ (2)
1.4 C ✓✓ (2) [8]

QUESTION 2

- 2.1 2.1.1 Mixture ✓ (1)
2.1.2 Pure Substance ✓ (1)
2.2 2.2.1 Temperature at which vapour pressure of a liquid equals atmospheric pressure. ✓✓ (2)
2.2.2 -20°C ✓ (1)
2.2.3 Liquid ✓
Point A lies between Melting point / (-20°C) and boiling point / (30°C) ✓ (2)
2.2.4 - Closely packed ✓
- Regular shape ✓
2.2.5 At time 25 to 35 minutes
- Stage whereby a solid is converted to a gas by adding energy (heat). ✓
- Energy (heat) added is absorbed by particles to increase vibrations / internal energy of particles. ✓ (2)
2.2.6 Gas ✓ (1)

2.3

2.3.1 Homogeneous mixture. ✓

(1)

2.3.2 The two liquids are soluble ✓ (dissolve) in each other. Alcohol goes in the spaces between the water molecules. ✓

(2)

2.3.3 Boiling point ✓

(1)

2.3.4 (Fractional) distillation ✓

(1)

2.3.5 Process by which a gas or vapor changes to a liquid by cooling or increase in pressure. ✓ ✓

(2)
[20]

QUESTION 3

3.1 Atoms of the same element (with the same number of protons, but having) different number of neutrons. ✓

(1)

3.2 $N = A - Z$

$$= 37 - 17$$

$$= 20 \checkmark$$

(1)

3.3

$$R.A.M = \frac{M^{35}_{Cl} \times \% \text{ abundance}}{100\%} + \frac{M^{37}_{Cl} \times \% \text{ abundance}}{100\%}$$

$$35.50 = \frac{M^{35}_{Cl} \times 75.77\%}{100\%} + \frac{34.969 \times 24.23\%}{100\%}$$

$$M^{35}_{Cl} = 35.67 \text{ g mol}^{-1} \checkmark$$

(4)

3.4

3.4.1 Mg / Magnesium ✓

(1)

3.4.2 Alkali-earth metals. ✓

(1)

3.4.3 $1s^2 2s^2 2p^6 3s^2 3p^0$ ✓ ✓

(2)

3.4.4 Neon ✓ ✓

(2)
[12]

QUESTION 4

4.1 Bond involving sharing of electrons between atoms to form molecules. ✓

(1)

4.2



(2)

4.3

4.3.1 Contains delocalised electrons ✓ which conduct the current when a potential difference is applied.

(2)

4.3.2 Decreases ✓

(1)

4.4

4.4.1 Substance that has properties of metals and non-metals. ✓

(1)

4.4.2 Increases ✓

(1)

4.5

4.5.1 Ammonia ✓

(1)

4.5.2 Magnesium sulphate ✓

(1)

4.6 $Al(NO_3)_3$ ✓(1)
[11]

TOTAL MARKS: [50]