education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCE: CHEMISTRY (P2)

COMMON TEST

MARCH 2019

MARKS: 50

TIME: 1 hour

This question paper consists of 6 pages and a Periodic Table.

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INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE 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.

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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 Silicon is classified as a ...

A. Metal
B. Non-Metal
C. Semi-metal
D. Heterogeneous mixture (2)

1.2 The tendency of an atom in a molecule to attract the bonding electrons is known as the ...

A. Atomic radii
B. Electron affinity
C. Electronegativity
D. Ionization energy (2)

1.3 The valency of sulphur in the elemental form is ...

A. 2
B. 3
C. 6
D. 16 (2)
[6]

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QUESTION 2

2.1 Write down the definition of a homogeneous mixture. (2)

2.2 Study the following table and answer the questions that follow.

A	Iron filings and sand	B	CCl_4
C	Mg	D	Al_2O_3
E	Water	F	Oil
G	Sodium sulphate		

2.2.1 Identify the substance that is in the elemental form in the table. (1)

2.2.2 Write down the name of substance B. (1)

2.2.3 What is the name of substance D. (1)

2.2.4 Write down the chemical formula for substance G. (2)

2.2.5 Name a suitable technique that can be used for the separation of substance A into its components. (1)

Equal volumes of E and F are mixed together in a beaker.

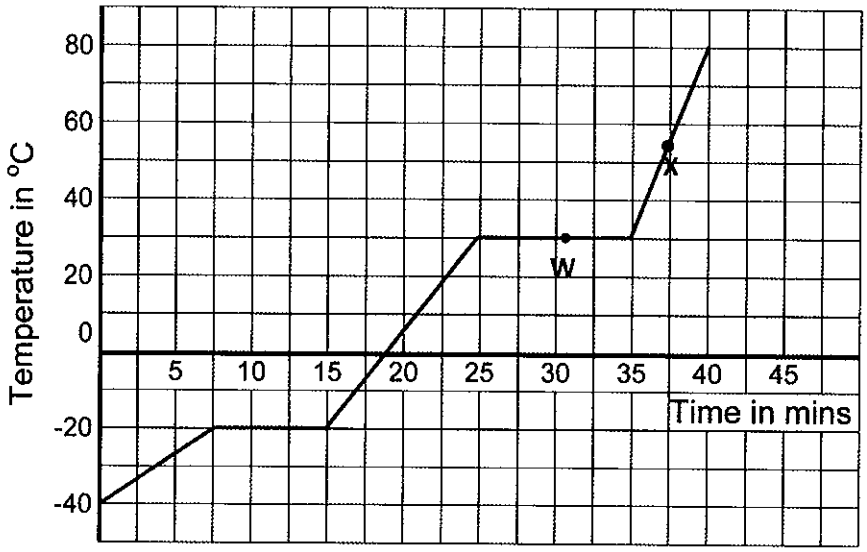
2.2.6 Is this a homogeneous or heterogeneous mixture? Give a reason. (2)

2.2.7 Describe a simple method by which this mixture can be separated into its components in the laboratory. (2)
[12]

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QUESTION 3

Grade 10 learners conducted an experiment to determine the heating curve of a substance under standard atmospheric pressure. The results obtained are shown in the graph below.



3.1 State the definition of the freezing point of a substance. (2)

3.2 Write down phases of the substance at point **W**. (2)

3.3 Complete the following statement using one of the following terms:

GREATER THAN; LESS THAN or EQUAL TO. (Write down only the answer in your answer book.)

*"The average forces of attraction between the particles at point **X** are _____ the average forces of attraction between the particles at point **W**."* (1)

3.4 For the above experiment write down the controlled variable (1)

3.5 Between time 7,5 and 15 minutes, the graph shows no change in temperature. Explain this observation. (2)

3.6 Is the above substance water? Write only YES or NO.
Give a reason (2)
[10]

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QUESTION 4

4.1

4.1.1 State the definition of *ionization energy.* (2)

4.1.2 Explain why ionization energy increases on going across a period. (3)

4.2 For each of the following questions, choose from INCREASES; DECREASES or REMAINS THE SAME.

4.2.1 How does the electronegativity of elements change on going across a period? (1)

4.2.2 How does the atomic radius of elements change on going down a group? (1)

4.3

4.3.1 How many neutrons are there in the atom ^{42}Ca ? (1)

4.3.2 How many protons are there in the sodium ion, Na^+ ? (1)

4.4 What is the name of the group in which sodium is found? (1)

4.5 The following table shows the isotopes of carbon and their percentage abundance.

Isotopes	Percentage Abundance
^{12}C	98,89%
^{13}C	1,11%

If the atomic mass number of ^{12}C is 12,011 $g.mol^{-1}$ and the relative atomic mass of carbon is 12,00 $g.mol^{-1}$ calculate the atomic mass number of ^{13}C. (3)

4.6 Write down the electronic configuration (sp notation) for the chlorine atom. (2)
[15]

QUESTION 5

5.1 Write down the definition of a covalent bond. (2)

5.2 Draw Lewis structures for the following substances.

5.2.1 NH_3 (2)

5.2.2 $MgBr_2$ (2)

5.3 What is the name of the bond between the atoms of copper in a copper pipe? (1)
[7]

TOTAL MARKS: [50]

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TABLE 3: THE PERIODIC TABLE OF ELEMENTS

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

58 Ce 140	59 Pr 141	60 Nd 144	61 Pm	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175
90 Th 232	91 Pa	92 U 238	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

KEY/*SLEUTEL*

Atomic number
Atoomgetal

Electronegativity
Elektronegatiwiteit

Symbol
Simbool

Approximate relative atomic mass
Benaderde relatiewe atoommassa

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PROVINCE OF KWAZULU-NATAL

PHYSICAL SCIENCES P2 (CHEMISTRY)

MARKING GUIDELINE

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This marking guideline consists of 4 pages.

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SECTION A

QUESTION 1

1.1 C ✓✓ (2)

1.2 C ✓✓ (2)

1.3 A ✓✓ (2)
[6]

QUESTION 2

2.1 Homogeneous mixture is a mixture of uniform composition and in which all components are in the same phase ✓✓ (2)

2.2.1 A / magnesium / iron filings✓ (any one) (1)

2.2.2 Carbon tetrachloride ✓✓ (1)

2.2.3 Aluminum (III) oxide ✓ (1)

2.2.4 Na_2SO_4 ✓✓ (2)

2.2.5 Magnetic Attraction ✓ (1)

2.2.6 Heterogeneous ✓ On mixing the substance exists as two phases✓ (2)

2.2.7 Decanting whereby the mixture is allowed to settle and the less dense (oil) component will be a top layer ✓, would be poured out thus leaving behind water ✓ OR
Pour the mixture into a separating funnel. ✓
Open the tap. The more dense water will flow out first ✓.
Close the tap. The oil is left behind (2)
[12]

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QUESTION 3

3.1 The freezing point is the temperature at which a liquid changes to a solid (by the removal of heat energy). ✓✓ (2)

3.2 Liquid and gaseous phases. ✓ ✓ (2)

3.3 LESS THAN✓ (1)

3.4 Atmospheric pressure ✓ (1)

3.5 At time 7,5 to 15 minutes
- Stage whereby a solid is converted to a liquid by adding energy (heat).
- Energy (heat) added is absorbed ✓by particles to increase vibrations / internal energy of particles. ✓ (2)

3.6 No ✓, the boiling point is not equal 100°C✓or melting point is not equal to 0°C. (2)
[10]

QUESTION 4

4.1

4.1.1 The ionization energy is the energy needed to remove a mole of electron(s) from a mole of gaseous atoms. ✓✓ (2)

4.1.2 The <u>number of protons increases</u>✓, <u>electrons are entering the same energy level</u>✓, thus <u>force of attraction between electrons and the nucleus increases</u>. ✓ (3)

4.2

4.2.1 Increases ✓ (1)

4.2.2 Increases ✓ (1)

4.3

4.3.1 22 ✓ (1)

4.3.2 11 ✓ (1)

4.4 Alkali metals ✓ (1)

4.5

$$\text{R.A.M} = \frac{\mathbf{M}^{12}\text{c} \times \%\text{ abundance}}{100\%} + \frac{\mathbf{M}^{13}\text{c} \times \%\text{ abundance}}{100\%}$$

$$12{,}00 = \frac{12{,}011 \times 98{,}89✓}{100\%} + \frac{\mathbf{M}^{13}\text{c} \times 1{,}11\%✓}{100\%}$$

$$\mathbf{M}^{13}\text{c} = 11{,}999\ (12)\ \text{g.mol}^{-1}✓$$

(3)

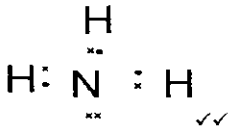
4.6 $1s^2 2s^2 2p^6 3s^2 3p^5$ ✓✓ (2)
[15]

QUESTION 5

5.1 Covalent bond is defined as the sharing of electrons between atoms to form molecules. ✓✓ (2)

5.2

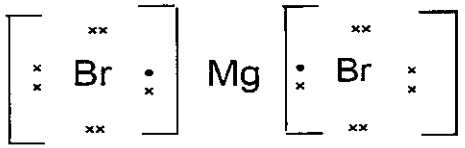
5.2.1



✓✓

(2)

5.2.2 ✓✓



(2)

5.3 Metallic bond. ✓ (1)
[7]

TOTAL MARKS: [50]