GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

NOVEMBER 2021

GRADE 10

MARKING GUIDELINES

PHYSICAL SCIENCES (CHEMISTRY) (PAPER 2)

6 pages

EXEMPLAR

SECTION A:

QUESTION 1

1.1 B ✓✓ (2)

1.2 D ✓✓ (2)

1.3 C ✓✓ (2)

1.4 D ✓✓ (2)

1.5 A ✓✓ (2)

1.6 D ✓✓ (2)

1.7 B ✓✓ (2)

1.8 D ✓✓ (2)

1.9 B ✓✓ (2)

1.10 D ✓✓ (2)

[20]

TOTAL SECTION A: 20

EXEMPLAR

SECTION B

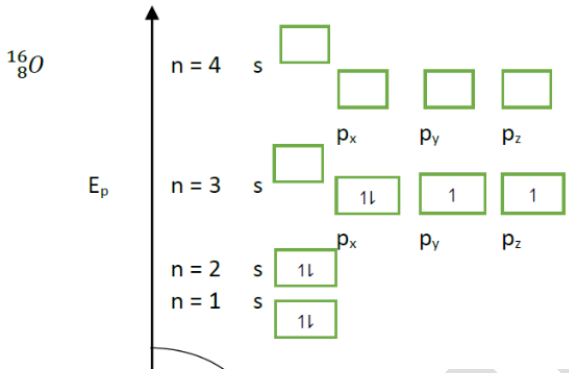
QUESTION 2

2.1 $2KC\ell O_3(s) \rightarrow 2KC\ell(s) + 3O_2(g)$ ✓ (1)

2.2 1:1:3 ✓ (1)

2.3 potassium chloride ✓ (1)

2.4 pure ✓ substance because it is a compound ✓ (2)

2.5 

✓ $1s^2$

✓ $2s^2$

✓ $2p^4$ 1 paired and 2 unpaired (3)

2.6 

✓ 6 valency electrons for each oxygen
✓ double bond (2)

2.7 test tube ✓ (1)

[11]

QUESTION 3

3.1 H_2O (1)

3.2 solid (1)

3.3 Melting is a <u>physical process</u> that results in the phase transition of a substance from a solid to a liquid. (not melting point) (2)

3.4 The kinetic energy of the particles increases ✓ because in a phase the particles move faster.

The potential energy of the particles stays constant ✓ because in a phase the position of the particles does not change. ✓ (2)

3.5 Boiling point (of water) ✓ (1)

3.6 The water will evaporate (form steam) ✓ and the temperature will increase. ✓ (2)

[9]

EXEMPLAR

QUESTION 4

4.1 Isotopes are two or more types of atoms that have the same atomic number and position in the periodic table and that differ in nucleon numbers due to different numbers of neutrons. ✓✓ (2)

4.2 protons ✓✓ (1)

4.3 $A_r(N) = \frac{(99,6\ x14)+(0,4\ x\ 15)\ ✓}{100\ ✓}$ = 14,004 (3)

4.4 % N = $\frac{3A_r(N)}{M_r(NH_4)_3PO_4}\ x\ 100 = \frac{3(14)}{149✓}\ x\ 100✓$ = 28,19 % N (3)

4.5 $n = \frac{m}{M}✓ = \frac{82,24}{14\ ✓}$ = 5,874 mol N $n = \frac{m}{M} = \frac{17,76}{1\ ✓}$ = 17,76 mol H (3)

$\frac{5,874}{5,874} : \frac{17,76}{5,874}$ ✓

1:3 ✓ (NH_3)

Ammonia ✓ (not ammonium) (6)
[15]

QUESTION 5

5.1 To flavour food ✓ (any logical answer) (1)

5.2 A lighted ✓ splint will pop ✓ (2)

5.3 Hydrogen is flammable ✓/hydrochloric acid is corrosive/sodium reacts highly with water. (1)

5.4 $2Na + 2HC\ell \rightarrow 2NaC\ell + H_2$ (1)

5.5 5.5.1 B ✓ (1)

5.5.2 A ✓ (1)

5.6 $c = \frac{m}{MV}\ ✓ = \frac{25}{(58,5\ ✓)(0,25\ ✓)}$ = 1,71 mol·dm^{-3} ✓ $NaC\ell$ (4)
[11]

EXEMPLAR

QUESTION 6

6.1 6.1.1 metallic ✓ (1)

6.1.2 covalent ✓ (1)

6.1.3 covalent ✓ (1)

6.1.4 ionic ✓ (1)

6.2 One mole is the amount of substance having the same number of particles as there are atoms in 12 g carbon-12. ✓✓ (2)

6.3 6.3.1 $n = \frac{m}{M}$✓ $= \frac{317,5}{127}$✓ $=$ 2,5 mol I_2 (3)

6.3.2 $n(I_2) : n(A\ell)$

3:2

2,5 : 1,67 mol Aℓ

$n = \frac{N}{N_A}$

$1,67$ ✓ $= \frac{N}{6,02\ x\ 10^{23}}$ ✓

N = 1,003 x 10^{24} ✓ atoms Aℓ (3)

6.4 $n = \frac{m}{M}$✓ $= \frac{20,4}{408}$✓ = 0,05 mol $A\ell I_3$ ✓

$n(A\ell I_3) : n(A\ell)$

2 : 2

0,05:0,05 mol Aℓ

$n = \frac{N}{N_A}$

0,05 ✓ = $\frac{m}{27}$✓

m = 1,35 g Aℓ ✓ (6)

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EXEMPLAR

QUESTION 7

7.1 The number of protons in the nucleus of an atom. ✓✓ (2)

7.2 Top ✓, right ✓ (2)

7.3 ion ✓ (1)

7.4 earth-alkaline metals ✓ (1)

7.5 two/2 ✓ (1)

7.6 magnesium ✓ (not Mg) (1)

7.7 7.7.1 Energy needed per mole to remove an electron from an atom in the gaseous phase ✓✓ (2)

7.7.2 From the top to the bottom in a group ✓ the ionization energy decreases. (2)

7.7.3 Phosphorous will have 3 unpaired electrons in the p-orbitals and ✓ sulfur will have a pair of electrons in the p-orbitals. ✓
Less energy is needed to remove the last electron from sulfur ✓
because the electrons in the orbital will repel one another. ✓ (4)

[16]

TOTAL SECTION B: 80

TOTAL MARKS: 100

EXEMPLAR