



Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

PHYSICAL SCIENCES
INFORMAL TEST 2
APRIL 2019

UMLAZI DISTRICT

GRADE 12

TIME: 1 hour

MARKS: 50

This question paper consists of 5 pages.

QUESTION ONE: MULTIPLE CHOICE

Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A-D) next to the question number (1.1-1.5) in The ANSWER BOOK, for example 1.11 D.

- 1.1 A piece of magnesium is added to a beaker containing an excess of dilute hydrochloric acid.
Which ONE of the following will NOT increase the rate of this reaction?
- A. Adding more of the same dilute hydrochloric acid
 - B. Adding some concentrated hydrochloric acid to the beaker
 - C. Crushing the magnesium
 - D. Adding another piece of magnesium to the beaker (2)
- 1.2 Which ONE of the statements concerning a CATALYST is TRUE?
- A. It increases the yield of products
 - B. It is not consumed in the reaction
 - C. It decreases the heat of the reaction
 - D. It increases the kinetic energy of the particles (2)
- 1.3 When a piece of zinc is added to some dilute hydrochloric acid the reaction rate first increases and then gradually decreases.
The possible reason for this is that:
- A. The activation energy is slowly decreasing
 - B. The kinetic energy of the particles starts to decrease
 - C. The concentration of the hydrochloric acid decreases
 - D. The heat of the reaction gets smaller (2)
- 1.4 The following reaction reaches equilibrium in a 2 dm³ flask:
- $$\text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons \text{PCl}_5(\text{g}) \quad \Delta H < 0$$
- Which ONE of the following changes to the conditions at equilibrium will INCREASE the K_c value?
- A. Cooling the flask
 - B. Heating the flask
 - C. Removing PCl₅ as soon as it forms
 - D. Adding more PCl₃ to the flask (2)

1.5 For the reaction $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$ $\Delta H < 0$,

When equilibrium is attained, the rate of the

- A. Reverse reaction becomes zero
- B. Reverse and forward reactions become zero
- C. Forward reaction just equals the rate of the reverse reaction
- D. Forward reaction is equal to the rate of the reverse reaction

(2)

[10]

QUESTION TWO

2.1 State the definition of *rate of a reaction*

(1)

2.2 In terms of the Collision Theory,

2.2.1 What is meant by an *effective collision*?

(1)

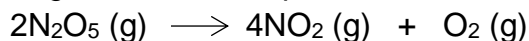
2.2.2 State two conditions that are necessary for an effective collision

(1)

2.2.3 Explain the effect of increasing concentration on the rate of a reaction

(4)

2.3 The following reaction takes place in a laboratory:



Initially 1,40 moles of N_2O_5 was placed in a sealed flask and allowed to react. The following data was obtained for the amount of N_2O_5 present in the flask as the reaction proceeded

Amount N_2O_5 (mol)	Time (minutes)
1.40	0
1.22	30
1.10	45
0.8	120

2.3.1 Calculate the average rate of this reaction (in $\text{mol} \cdot \text{min}^{-1}$) after 120 minutes.

(4)

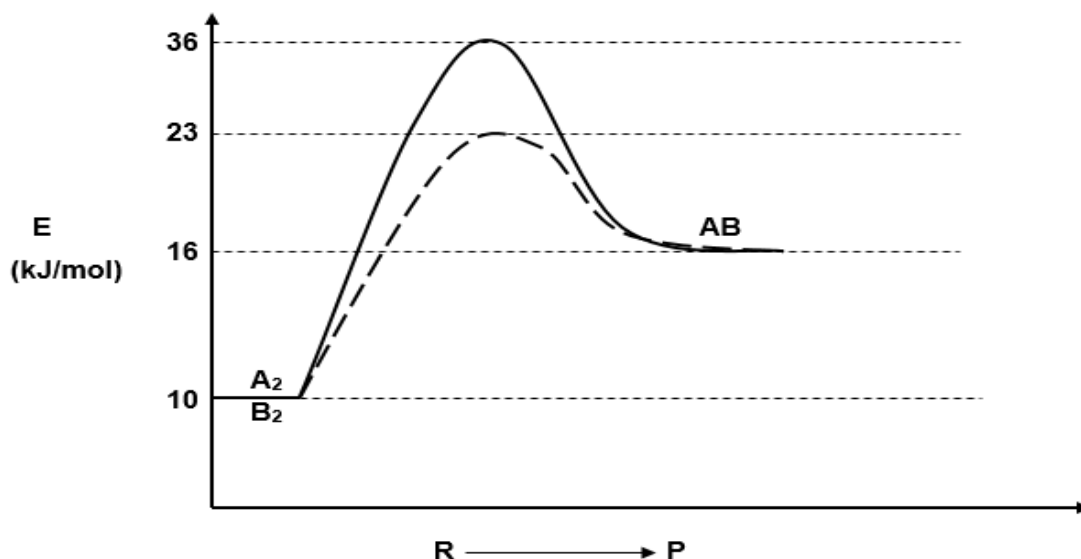
2.3.2 Calculate the mass of oxygen present in the flask after 120 minutes

(5)

[16]

QUESTION THREE

The following is a sketch graph for the reversible reaction:

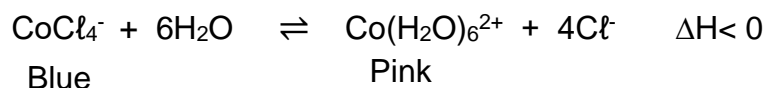


Use the sketch graph to answer the following questions.
What is the:

- | | | |
|-----|--|-----|
| 3.1 | ΔH for the forward uncatalyzed reaction? | (1) |
| 3.2 | ΔH for the reverse catalysed reaction? | (1) |
| 3.3 | Activation energy for the forward catalysed reaction? | (1) |
| 3.4 | Activation energy for the reverse uncatalyzed reaction? | (1) |
| 3.5 | Potential energy of the reactants in the endothermic reaction? | (1) |

[5]**QUESTION FOUR**

- | | | |
|-----|---|-----|
| 4.1 | State Le' Chatelier's Principle | (1) |
| 4.2 | A solution of cobalt chloride in ethanol appears blue due to the presence of the CoCl_4^- ion.
When water is added to the solution it turns pink. | |



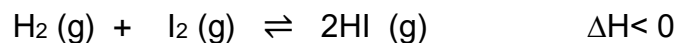
What colour will be observed in each case to the PINK solution in a beaker when:

- 4.2.1 A few drops of concentrated HCl is added to it? (1)
4.2.2 The beaker is placed in a tray of ice cubes? (1)
4.2.3 The beaker is heated mildly?
Explain the answer in terms of Le' Chatelier's Principle (4)
4.2.4 A dehydrating agent such as concentrated sulphuric acid is added to the beaker? (1)

[8]

QUESTION FIVE

The following reaction reaches equilibrium in a 2 dm^3 flask at 415°C .



- 5.1 Initially 2 moles of H_2 and 2 moles of I_2 were placed in the flask. At equilibrium there was 0,44 moles of H_2 present. Calculate the value of K_c at this temperature. (6)
- 5.2 The volume of the flask is now reduced to 1 dm^3 whilst keeping the temperature constant.
How will this change affect each of the following?
(Choose from INCREASES; DECREASES or REMAINS THE SAME)
- 5.2.1 The K_c value (1)
5.2.2 The initial rate of the forward reaction. Give a reason for the answer. (2)
5.2.3 The yield of HI . Give a reason for the answer. (2)

[11]

[50]

Data:

$$C = n/v$$

$$n = m/M$$

RAM: N = 14; O = 16; H = 1; I = 127