

IMPORTANT

USE NO. 2 PENCIL ONLY

EXAMPLE: ☐ A ☐ B ☒ C ☐ D ☐ E

ERASE COMPLETELY TO CHANGE

NAME

TESTS Data No. 04

SUBJECT

DATE

HOUR

ACCUSCAN™ #25110-RR 01/01 (Ref # ABF-882) 62864

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TEST RECORD

PART 1

PART 2

TOTAL

KEY

(T) (F)

1 2 3

1 ☐ A ☐ B ☒ C ☐ D ☐ E2 ☐ A ☒ B ☐ C ☐ D ☐ E3 ☐ A ☐ B ☒ C ☐ D ☐ E4 ☒ A ☐ B ☐ C ☐ D ☐ E5 ☐ A ☐ B ☐ C ☒ D ☐ E6 ☐ A ☐ B ☒ C ☐ D ☐ E7 ☐ A ☐ B ☒ C ☐ D ☐ E8 ☒ A ☐ B ☐ C ☐ D ☐ E9 ☒ A ☐ B ☐ C ☐ D ☐ E10 ☐ A ☐ B ☒ C ☐ D ☐ E11 ☐ A ☐ B ☒ C ☐ D ☐ E12 ☐ A ☒ B ☐ C ☐ D ☐ E13 ☐ A ☐ B ☒ C ☐ D ☐ E14 ☐ A ☒ B ☐ C ☐ D ☐ E15 ☒ A ☐ B ☐ C ☐ D ☐ E16 ☒ A ☐ B ☐ C ☐ D ☐ E17 ☐ A ☐ B ☒ C ☐ D ☐ E18 ☐ A ☐ B ☒ C ☐ D ☐ E19 ☐ A ☐ B ☐ C ☒ D ☐ E20 ☐ A ☐ B ☐ C ☒ D ☐ E21 ☐ A ☐ B ☒ C ☐ D ☐ E22 ☐ A ☐ B ☐ C ☒ D ☐ E23 ☐ A ☒ B ☐ C ☐ D ☐ E24 ☐ A ☐ B ☐ C ☒ D ☐ E25 ☐ A ☐ B ☒ C ☐ D ☐ E26 ☐ A ☒ B ☐ C ☐ D ☐ E27 ☐ A ☐ B ☒ C ☐ D ☐ E28 ☐ A ☐ B ☐ C ☒ D ☐ E29 ☐ A ☐ B ☐ C ☒ D ☐ E30 ☒ A ☐ B ☐ C ☐ D ☐ E31 ☐ A ☐ B ☐ C ☐ D ☐ E32 ☐ A ☐ B ☐ C ☐ D ☐ E33 ☐ A ☐ B ☐ C ☐ D ☐ E34 ☐ A ☐ B ☐ C ☐ D ☐ E35 ☐ A ☐ B ☐ C ☐ D ☐ E36 ☐ A ☐ B ☐ C ☐ D ☐ E37 ☐ A ☐ B ☐ C ☐ D ☐ E38 ☐ A ☐ B ☐ C ☐ D ☐ E39 ☐ A ☐ B ☐ C ☐ D ☐ E40 ☐ A ☐ B ☐ C ☐ D ☐ E41 ☐ A ☐ B ☐ C ☐ D ☐ E42 ☐ A ☐ B ☐ C ☐ D ☐ E43 ☐ A ☐ B ☐ C ☐ D ☐ E44 ☐ A ☐ B ☐ C ☐ D ☐ E45 ☐ A ☐ B ☐ C ☐ D ☐ E46 ☐ A ☐ B ☐ C ☐ D ☐ E47 ☐ A ☐ B ☐ C ☐ D ☐ E48 ☐ A ☐ B ☐ C ☐ D ☐ E49 ☐ A ☐ B ☐ C ☐ D ☐ E50 ☐ A ☐ B ☐ C ☐ D ☐ E

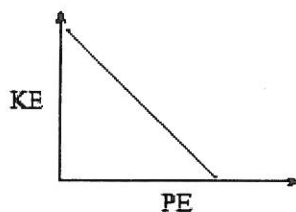
FEED THIS DIRECTION



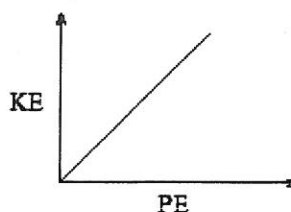
30.

The changes in PE and KE, as reactant molecules approach each other, can be represented by

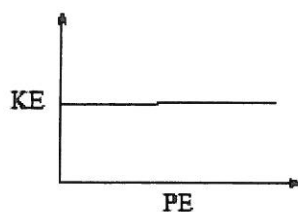
A.



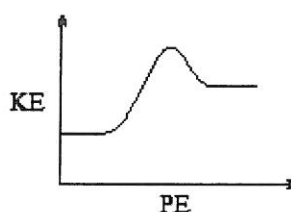
B.



C.



D.



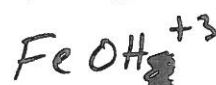
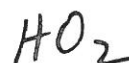
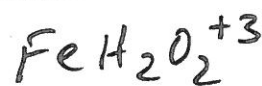
Part II: Written Section – show all work/calculations (including the correct number of significant digits) leading to the final answer to receive full marks.

1.

Consider the following proposed reaction mechanism:

Step 1	$\boxed{\text{Fe}^{3+}} + \text{H}_2\text{O}_2 \rightarrow \text{FeH}_2\text{O}_2^{3+}$
Step 2	$\text{FeH}_2\text{O}_2^{3+} \rightarrow \text{FeOH}^{3+} + \text{HO}$
Step 3	$\text{HO} + \text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{HO}_2$
Step 4	$\text{FeOH}^{3+} + \text{HO}_2 \rightarrow \boxed{\text{Fe}^{3+}} + \text{H}_2\text{O} + \text{O}_2$

Rxn Intermediates



a) Write the overall reaction. (1 mark)



b) Define the term *catalyst* and identify a catalyst in the above mechanism. (2 marks)

Definition: substance that speeds a rxn by providing an alternate mechanism with lower Ea. the substance is recovered after the rxn is done.

Catalyst: Fe^{3+}

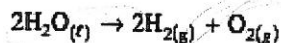
alternate (1)

(1)

2.

Consider the reaction:

(3 marks)



The rate of production of O_2 is $1.2 \times 10^{-2} \text{ mol/s}$. How many seconds will it take to decompose 100.0 g H_2O ?

$$\text{H}_2\text{O} \quad \frac{18.0\text{g}}{1\text{mol}} = \frac{100.0\text{g}}{x} = 5.5 \text{ mol of H}_2\text{O} \quad (1)$$

$$\frac{\text{H}_2\text{O}}{\text{O}_2} \quad \frac{2}{1} = \frac{5.5}{x} = 2.7 \text{ mol of O}_2 \quad (1)$$

$$\text{O}_2 \quad \frac{1.2 \times 10^{-2} \text{ mol}}{1\text{s}} = \frac{2.7 \text{ mol}}{x} = 231.48 \sim 230\text{s} \quad (1)$$

3.

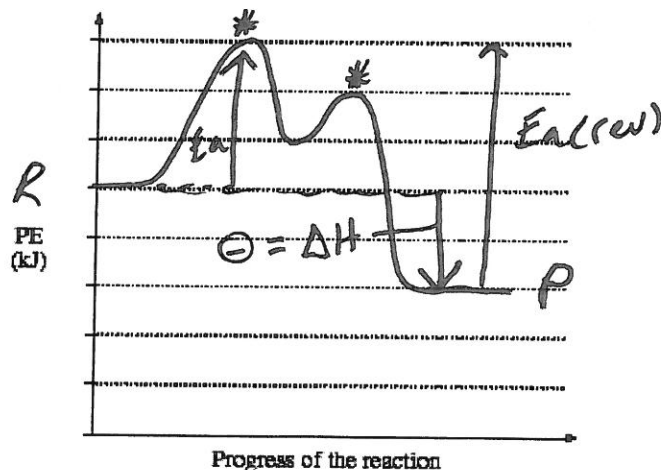
Consider the following reaction mechanism:

(2 marks)

Step 1	$\text{NO}_{(g)} + \text{O}_{2(g)} \rightarrow \text{NO}_{3(g)}$ <u>slow</u>
Step 2	$\text{NO}_{3(g)} + \text{NO}_{(g)} \rightarrow 2\text{NO}_{2(g)}$

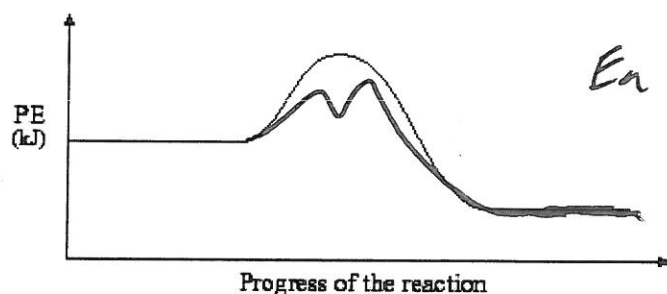
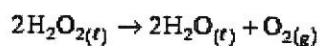
r.d.s $\therefore$ Largest E_a .

The overall reaction is exothermic. Sketch a PE diagram on the axes below to describe the energy changes that occur as the reaction takes place.



4.

Consider the following PE diagram for the uncatalyzed decomposition of hydrogen peroxide:



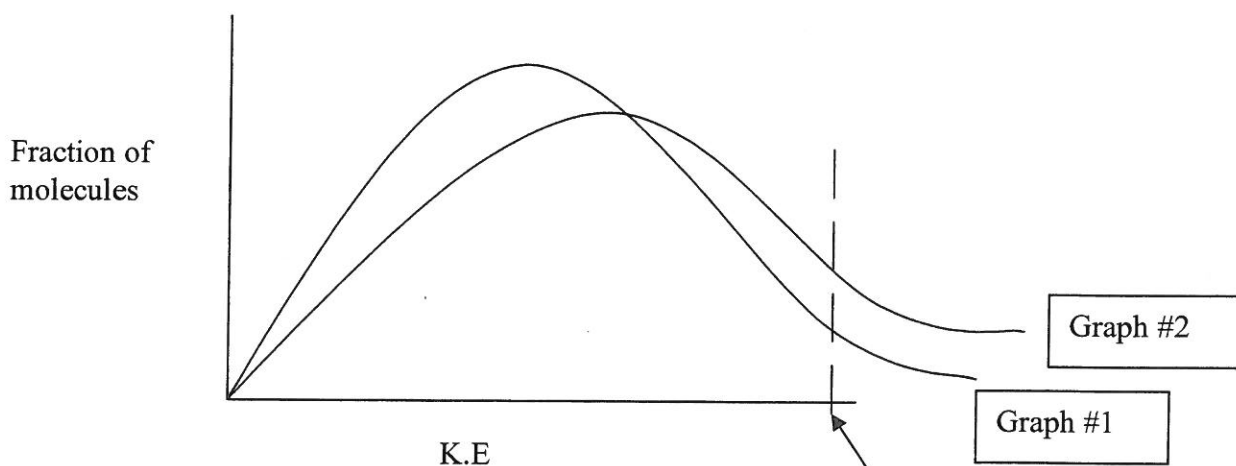
En for catalyzed ~~is~~ lower & there is one extra step because the catalyst adds an extra collision

a) On the PE diagram, sketch a curve for the catalyzed decomposition of H_2O_2 . (1 mark)

b) Explain why the minimum number of collisions to make products is different for the catalyzed reaction. (1 mark)

the catalyst adds one extra particle.
3 particle collisions are far less likely -
than 2 particle collisions.

5. Which factor could be responsible for causing the change in particle distribution from graph #1 to graph #2? (1 mark)



INC Temperature.

Min K.E needed for a reaction to occur.