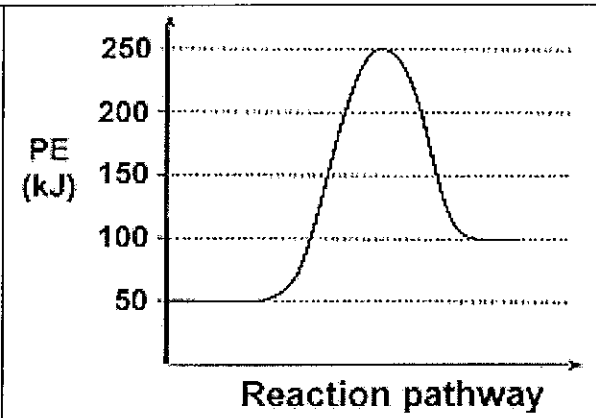
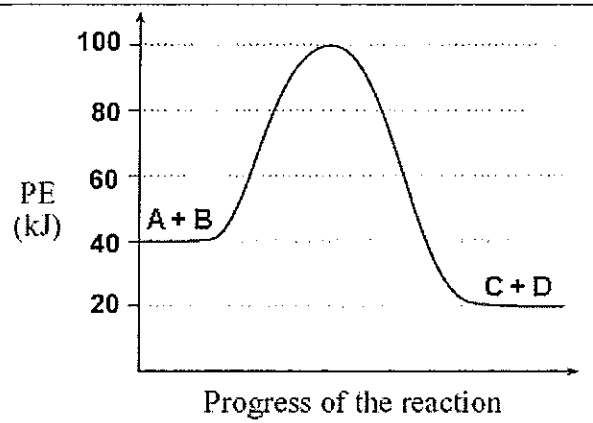
Regents Chemistry: PE Diagrams & Ref. Table I Name: KEY

		
Does the diagram represent an exothermic or endothermic process?	endothermic	exothermic
Determine the potential energy of the reactants	50 kJ	40 kJ
Determine the potential energy of the products	100 kJ	20 kJ
Determine the heat of reaction, including the sign and magnitude	+50 kJ	-20 kJ
Determine the activation energy of the forward reaction	200 kJ	60 kJ
Are the reactants or products more stable?	reactants	products
Describe heat flow, in terms of the system and surroundings.	heat flows from the surroundings to system	heat flows from the system to surroundings
If this reaction could go backwards, what would be the activation energy of the reverse reaction?	150 kJ	80 kJ

How does the information on Reference Table I relate to the information in a PE diagram?

Positive heat of reaction ($+\Delta H$) = endothermic

Negative heat of reaction ($-\Delta H$) = exothermic

How does the addition of a catalyst affect ….a potential energy diagram? …the reaction rate?

lowers the activation energy ("provides alternate pathway") ↑ increases rate (speeds up reaction)

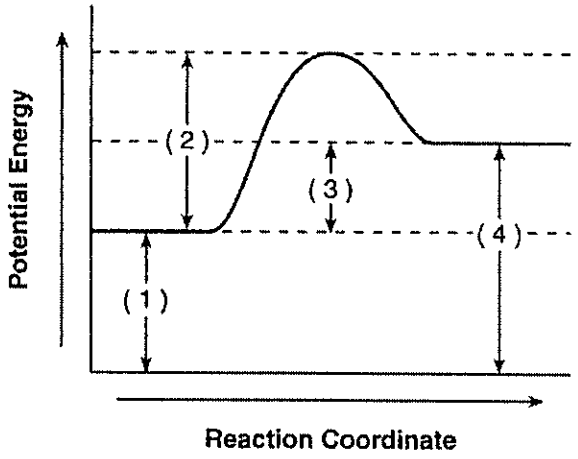
Regents Questions:

1.) For a chemical reaction, the difference between the potential energy of the products and the potential energy of the reactants is equal to the

(1) heat of fusion
(2) heat of reaction
(3) activation energy of the forward reaction
(4) activation energy of the reverse reaction

Base your answers to questions #2 – 4 on the information below.

The potential energy diagram and balanced equation shown below represent a reaction between solid carbon and hydrogen gas to produce 1 mole of $C_2H_4(g)$ at 101.3 kPa and 298 K.



$2C(s) + 2H_2(g) + 52.4\ kJ \rightarrow C_2H_4(g)$

2.) State what interval 2 represents.

activation energy

3.) State what interval 3 represents.

heat of reaction

4.) Determine the net amount of energy absorbed when 2.00 moles of $C_2H_4(g)$ are produced.

104.8 kJ

5.) According to Table I, which equation represents a change resulting in the greatest quantity of energy released?

(1) $2C(s) + 3H_2(g) \rightarrow C_2H_6(g)$ -84
(2) $2C(s) + 2H_2(g) \rightarrow C_2H_4(g)$ +52.4
(3) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ -91.8
(4) $N_2(g) + O_2(g) \rightarrow 2NO(g)$ +182.6

6.) At 101.3 kPa and 298 K, a 1.0-mole sample of which compound absorbs the greatest amount of heat as the entire sample dissolves in water?

(1) LiBr -48.8
(2) NaOH -44.5
(3) NaCl +3.88
(4) NH4Cl +14.78

7.) Which balanced equation represents an endothermic reaction?

(1) $N_2(g) + O_2(g) \rightarrow 2NO(g)$ +182.6
(2) $C(s) + O_2(g) \rightarrow CO_2(g)$ -393.5
(3) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ -91.8
(4) $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$ -890.4

8.) At 101.3 kPa and 298K, which salt releases energy as it dissolves?

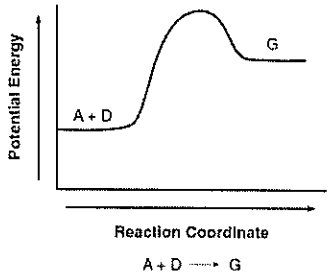
(1) NaCl +3.88
(2) NH_4NO_3 +25.69
(3) KNO_3 +34.89
(4) LiBr -48.83

9.) At 101.3 kPa and 298 K, which change occurs when pellets of solid NaOH are added to water and stirred?

(1) The water temperature decreases as heat energy is stored as chemical energy.
(2) The water temperature increases as heat energy is stored as chemical energy.
(3) The water temperature decreases as chemical energy is converted to heat energy.
(4) The water temperature increases as chemical energy is converted to heat energy.

ΔH = -44.51

10.) Given the potential energy diagram and equation representing the reaction between substances A and D:



According to Table I, substance G could be

(1) HI(g) +53
(2) $H_2O(g)$ -483.6
(3) $CO_2(g)$ -393.5
(4) $C_2H_6(g)$ -84