

Quiz Review NOT FOR A GRADE

1. What are the 5 factors that will increase the rate of reaction?

- increase concentration
- increase surface area
- increase temperature
- add a catalyst
- increase pressure (only gases)

TABLE 8.2 Standard Heats of Formation for Some Common Substances at 25°C

Substance	Formula	$\Delta H_f^\circ$ (kJ/mol)	Substance	Formula	$\Delta H_f^\circ$ (kJ/mol)
Acetylene	$C_2H_2(g)$	226.7	Hydrogen chloride	$HCl(g)$	-92.3
Ammonia	$NH_3(g)$	-46.1	Iron(III) oxide	$Fe_2O_3(s)$	-824.2
Carbon dioxide	$CO_2(g)$	-393.5	Magnesium carbonate	$MgCO_3(s)$	-1095.8
Carbon monoxide	$CO(g)$	-110.5	Methane	$CH_4(g)$	-74.8
Ethanol	$C_2H_5OH(l)$	-277.7	Nitric oxide	$NO(g)$	90.2
Ethylene	$C_2H_4(g)$	52.3	Water(g)	$H_2O(g)$	-241.8
Glucose	$C_6H_{12}O_6(s)$	-1260	Water(l)	$H_2O(l)$	-285.8

$$\Delta H = \sum P - \sum R$$

2. Calculate the heat of formation:  $2CO_2(g) + 2H_2O(l) \rightarrow C_2H_4(g) + 3O_2(g)$

$$\Delta H = [(52.3) + 3(0)] - [2(-393.5) + 2(-285.8)] = +1411.4 \text{ kJ}$$

endo

3. Calculate the heat of formation:  $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$

$\uparrow \quad \uparrow$   
 elements = 0

$$2(-824.2) = -1648.4$$

exo

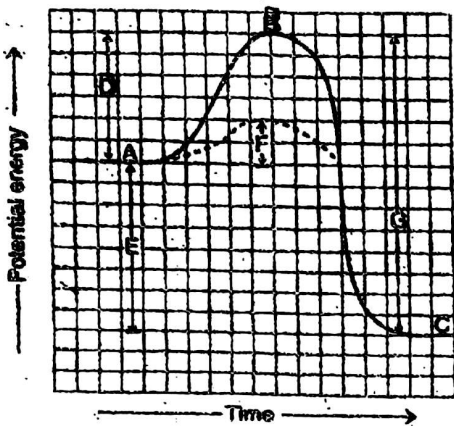
4. Determine whether the following is increasing ( $\Delta S = +$ ), decreasing ( $\Delta S = -$ ), or no change ( $\Delta S = 0$ ), in entropy.

- a.  $Br_2(g) \rightarrow Br_2(l)$   $\Delta S = -$
- b.  $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$   $\Delta S = -$
- c.  $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(l)$   $\Delta S = 0$
- d.  $CO_2(s) \rightarrow CO_2(g)$   $\Delta S = +$
- e.  $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$   $\Delta S = +$
- f.  $Ca^{+2}(aq) + 2Cl^{-}(aq) \rightarrow CaCl_2(s)$   $\Delta S = -$

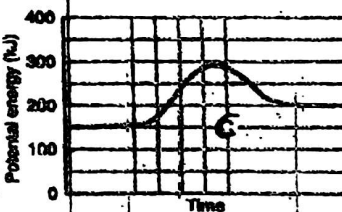
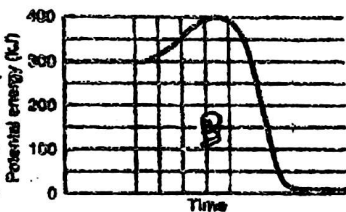
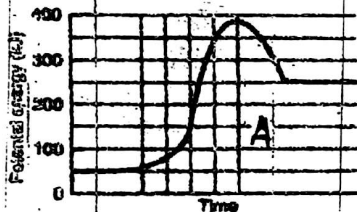
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**CONCEPT REVIEW**

The graph below shows the energy changes involved in an uncatalyzed and a catalyzed reversible reaction. Match the following descriptions with the letters on the graph.



- F. 1. activation energy of the forward catalyzed reaction
- A. 2. relative energy of the reactants for the forward reaction.
- C. 3. relative energy of the products for the forward reaction
- E. 4. difference in energy between the reactants and products
- D. 5. activation energy of the forward uncatalyzed reaction
- G. 6. activation energy of the reverse uncatalyzed reaction
- B. 7. relative energy of the activated complex



Write the letter of the graph(s) above that match the following descriptions and answer the questions.

- A. 8. shows the lowest initial energy state for the reactants for the forward reaction
- A. 9. shows the greatest activation energy for the forward reaction
- B. 10. shows the reaction with the greatest change in the heat content of the reactants and products
- A, C. 11. shows forward reaction in which heat is absorbed
- B, D. 12. shows forward reaction in which heat is released
- A. 13. would benefit most from the addition of a catalyst
- B. 14. shows the greatest activation energy for the reverse reaction