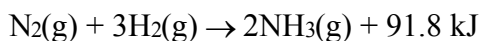


Use Reference Table I to answer the following questions.

- \_\_\_\_\_ 1) Given the balanced equation representing a reaction:  $\text{H}_2 \rightarrow \text{H} + \text{H}$
- What occurs during this reaction?
- 1) Energy is absorbed as bonds are formed.
  - 2) Energy is absorbed as bonds are broken.
  - 3) Energy is released as bonds are formed.
  - 4) Energy is released as bonds are broken.
- \_\_\_\_\_ 2) Given the equation:  $\text{I} + \text{I} \rightarrow \text{I}_2 + 35 \text{ kJ}$   
This equation shows that the formation of an iodine molecule is an
- 1) exothermic process in which energy is absorbed
  - 2) exothermic process in which energy is released
  - 3) endothermic process in which energy is absorbed
  - 4) endothermic process in which energy is released
- \_\_\_\_\_ 3) For which compound is the process of dissolving in water exothermic?
- |         |                             |
|---------|-----------------------------|
| 1) NaCl | 3) $\text{NH}_4\text{Cl}$   |
| 2) NaOH | 4) $\text{NH}_4\text{NO}_3$ |
- \_\_\_\_\_ 4) Which balanced equation represents an endothermic reaction?
- 1)  $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$
  - 2)  $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\ell)$
  - 3)  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$
  - 4)  $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}(\text{g})$
- \_\_\_\_\_ 5) In what type of reaction do the products of the reaction always possess more potential energy than the reactants?
- |                |                |
|----------------|----------------|
| 1) endothermic | 3) spontaneous |
| 2) exothermic  | 4) redox       |
- \_\_\_\_\_ 6) According to Reference Table I, which compound is formed from its elements during an exothermic reaction?
- |                            |                            |
|----------------------------|----------------------------|
| 1) $\text{HI}(\text{g})$   | 3) $\text{NO}(\text{g})$   |
| 2) $\text{CO}_2(\text{g})$ | 4) $\text{NO}_2(\text{g})$ |

- \_\_\_\_\_ 7) Given the balanced equation representing a reaction:
- $$\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g}) + \text{CO}_2(\text{g}) + \text{heat}$$
- Which statement is true about energy in this reaction?
- 1) The reaction is exothermic because it releases heat.
  - 2) The reaction is exothermic because it absorbs heat.
  - 3) The reaction is endothermic because it releases heat.
  - 4) The reaction is endothermic because it absorbs heat.
- \_\_\_\_\_ 8) Given the reaction:
- $$A + B \leftrightarrow C + D + \text{heat}$$
- Which statement best describes this reaction?
- 1) The forward reaction is exothermic, and the reverse reaction is always exothermic.
  - 2) The forward reaction is exothermic, and the reverse reaction is always endothermic.
  - 3) The forward reaction is exothermic, and the reverse reaction can be either exothermic or endothermic.
  - 4) The forward reaction is endothermic, and the reverse reaction can be either endothermic or exothermic.
- \_\_\_\_\_ 9) Which expression represents the heat of reaction for a chemical change in terms of potential energy,  $PE$ ?
- 1)  $(PE_{\text{products}}) + (PE_{\text{reactants}})$
  - 2)  $(PE_{\text{products}}) - (PE_{\text{reactants}})$
  - 3)  $(PE_{\text{products}}) \times (PE_{\text{reactants}})$
  - 4)  $(PE_{\text{products}}) \div (PE_{\text{reactants}})$

10) Given the balanced equation representing a reaction at 101.3 kPa and 298 K:



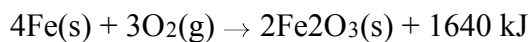
Which statement is true about this reaction?

- 1) It is exothermic and  $\Delta H$  equals  $-91.8 \text{ kJ}$ .
- 2) It is exothermic and  $\Delta H$  equals  $+91.8 \text{ kJ}$ .
- 3) It is endothermic and  $\Delta H$  equals  $-91.8 \text{ kJ}$ .
- 4) It is endothermic and  $\Delta H$  equals  $+91.8 \text{ kJ}$ .

11) Which reaction releases the greatest amount of energy per 2 moles of product?

- 1)  $2\text{CO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g})$
- 2)  $4\text{Al}(\text{s}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{Al}_2\text{O}_3(\text{s})$
- 3)  $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$
- 4)  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$

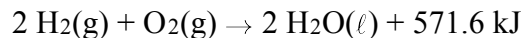
12) Given the balanced equation:



Which phrase best describes this reaction?

- 1) endothermic with  $\Delta H = +1640 \text{ kJ}$
- 2) endothermic with  $\Delta H = -1640 \text{ kJ}$
- 3) exothermic with  $\Delta H = +1640 \text{ kJ}$
- 4) exothermic with  $\Delta H = -1640 \text{ kJ}$

13) Given the reaction:



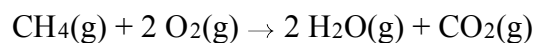
What is the approximate  $\Delta H$  for the formation of 1 mole of  $\text{H}_2\text{O}(\ell)$ ?

- 1)  $-285.8 \text{ kJ}$
- 2)  $+285.8 \text{ kJ}$
- 3)  $-571.6 \text{ kJ}$
- 4)  $+571.6 \text{ kJ}$

14) According to Reference Table I, when 2 moles of  $\text{H}_2\text{O}(\text{g})$  are formed from its elements,

- 1) 484 kJ of heat is absorbed
- 2) 484 kJ of heat is released
- 3) 242 kJ of heat is absorbed
- 4) 242 kJ of heat is released

15) Given the reaction:



What is the overall result when  $\text{CH}_4(\text{g})$  burns according to this reaction?

- 1) Energy is absorbed and  $\Delta H$  is negative.
- 2) Energy is absorbed and  $\Delta H$  is positive.
- 3) Energy is released and  $\Delta H$  is negative.
- 4) Energy is released and  $\Delta H$  is positive.