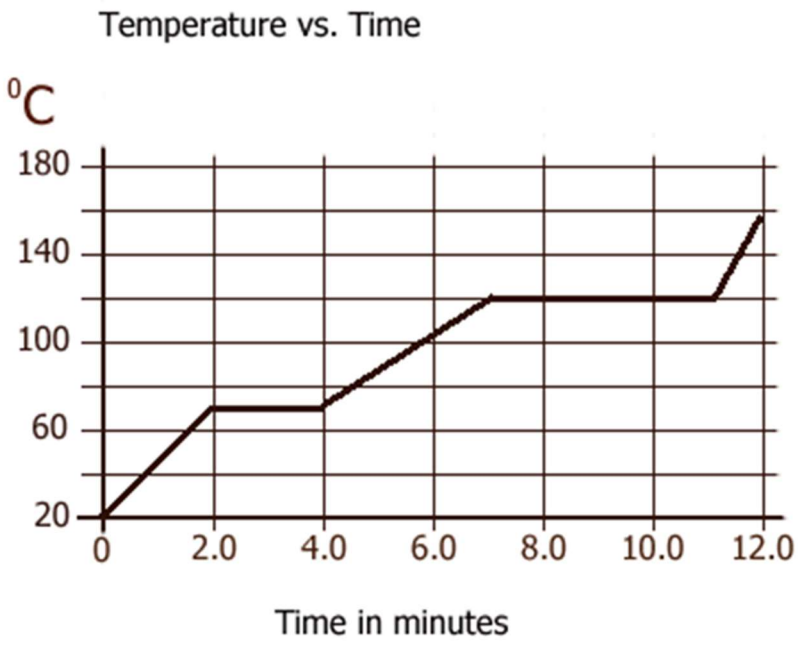
25 Regents Thermochemistry Questions

1. Given this balanced equation representing a reaction: $Cl_{2(G)} \rightarrow Cl_{(G)} + Cl_{(G)}$
   What occurs during this change?
   A. energy is absorbed and a bond is broken
   B. energy is absorbed and a bond is formed
   C. energy is released and a bond is broken
   D. energy is released and a bond is formed

2. Given the balanced equation: $I + I \rightarrow I_2$
   Which statement describes the process represented by this equation?
   A. A bond is formed as energy is absorbed
   B. A bond is formed as energy is released
   C. A bond is broken as energy is absorbed
   D. A bond is broken as energy is released

The temperature of a sample is increased from 20.°C to 160.°C as the sample absorbs heat at a constant rate of 15 kilojoules per minute at standard pressure. The graph represents the relationship between temperature +time as the sample is heated.



3. What is the boiling point of the sample?

4. What is the total time the sample is in the liquid phase?

5. Determine the amount of energy in Joules needed to melt the sample.

6. At STP, which list of elements contains a solid, liquid, and a gas?
   A. Ba, Br_2, B
   B. Cr, Cl_2, C
   C. Hf, Hg, He
   D. Se, Sn, Sr

7. At which temperature would atoms of $He_{(G)}$ have the highest kinetic energy?
   A. 25ºC
   B. 37ºC
   C. 273K
   D. 298K

8. The equation below represents a molecule of bromine separating into two bromine atoms.

$Br_2 \rightarrow Br + Br$ What occurs during this change?

A. energy is absorbed and a bond is formed
B. energy is absorbed and a bond is broken
C. energy is released and a bond is formed
D. energy is released and a bond is broken"

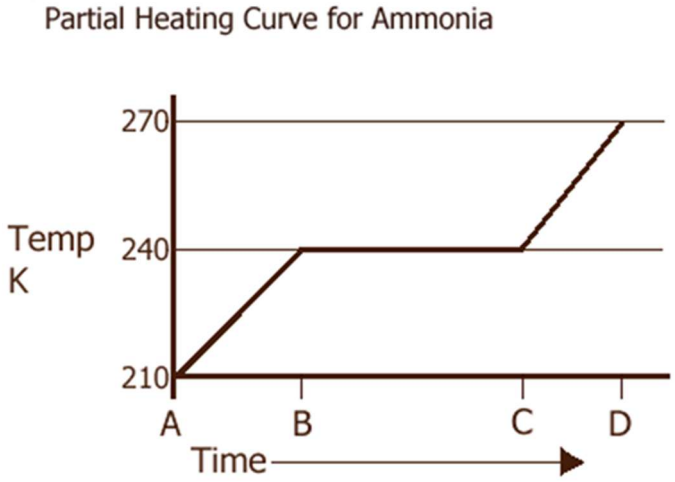
9. Given the balanced reaction as $N_{2(G)} + 3H_{2(G)} \rightarrow 2NH_{3(G)} + 91.8\ kJ$

Which statement is true about that reaction?

A. It is exothermic and the $\Delta H = -91.8$ kJ
B. It is exothermic and the $\Delta H = +91.8$ kJ
C. It is endothermic and the $\Delta H = -91.8$ kJ
D. It is endothermic and the $\Delta H = +91.8$

A 5.00 gram sample of liquid ammonia is originally at 210 K. The diagram of the partial heating curve above represents the vaporization of the sample at standard pressure due to the addition of heat. The heat is *not* added at a constant rate.

Physical constants for $NH_{3(L)}$	
Heat of fusion	332 J/g
Heat of vaporization	1370 J/g
Specific heat capacity	4.71 J/g·K



10. Calculate the total heat absorbed by the 5.00 g sample during time interval *AB*.
Your response must show a numerical set up and a calculated result.

11. Describe what is happening to both the potential energy and the average kinetic energy of the molecules during *BC*. Your response must include both potential and average kinetic energy.

12. State the phase or phases present during BC interval.

For questions 14 to 17, Do Not do the math, just tell how many SF the answer should have, and what formulas you would use to figure out the answers.

14. How much energy is required to melt 23.45 grams of ice at 0°C into water at the same temperature?

15. How many kilojoules of energy is needed to convert H_2O at 35.6°C into steam at 100.0°C?

16. How many joules of energy does it take to change 245.7 grams of water at 5.00°C into solid ice at 0°C?

17. Is question number sixteen an exothermic or endothermic process?

18. When you add 12,501 joules to 125.0 grams of copper. The temperature changes from an original 293.0 K to a new temperature. What temperature is it after getting these joules? (the C of Cu = 0.39 J/g·K)

19. Draw a cooling curve for IRON. Indicate the proper temperatures in Kelvin, and then label the points left to right ABCDE and F.

20. What formula is used to move from point B to C

21. What formula is used to move from point C to D

22. What formula is used to move from point E to F

23. Is kinetic energy increasing, decreasing, or holding steady on segment BC?

24. Is potential energy increasing, decreasing, or holding steady on segment CD?

25. Is kinetic energy increasing, decreasing, or holding steady on segment EF?

26. Would moving from point C to D be exothermic or endothermic?