Big Chem Problem Set

ENERGY AND PHASES

NaturalPhilosophers.org

1. Define energy and state its units.
2. Imagine you must generate electricity. At minimum, what objects do you need? State the name of the process makes this happen.
3. Describe and provide examples of each that were not given in the notes (this requires research): Potential Energy, Kinetic Energy, Chemical potential energy, Electricial potential energy, Thermal potential energy, Atomic potential energy, Activation energy.
4. Describe the difference between heat and temperature.
5. Convert each to celcius or kelvin: 273 K, 373 K, 15 K, 273°C , 373°C, 15°C.
6. Do gasses compress under pressure? Why?
7. Do liquids compress under pressure? Why?
8. What happens to the shape of a liquid as it is transferred from one container to another?
9. What happens to the volume of a liquid as it is transferred from one container to another?
10. How would a solid, such as a coin or a rock, behave under pressure or if its transferred to another container?
11. In a room are a glass of water, air and a table. All three objects are at equal temperature. Using the terms intermoleculare forces and kinetic energy, explain why the table is a solid, the water is a liquid and the air is a gas. A sufficient explanation will likely be at least one paragraph.
12. Vancouver, British Columbia is much further north than Fargo, North Dakota. Despite this, the weather in Fargo is much hotter in the summer, and much colder in the winter. Using your knowledge of specific heat, explain why.
13. The specific heat of aluminum is 0.88 J/g°C. How many joules will it take to make the temperature of 50. g of Al go from 20.°C to 70.°C?
14. What is the specific heat of silver if an 80.0 g sample is heated from 24.0°C to 49.0°C by adding 468.2 J?
15. The specific heat of iron is 0.46 J/g°C. How many joules will it take to make the temperature of a 150. g bar go from 25°C to 60.°C?
16. What is the specific heat of copper if a 75 g sample is heated from 20.°C to 24°C by adding 117 J?
17. There are six phase changes water can undergo. Describe each one and name it.
18. How many joules are needed to change the temperature of 100 g of water from 20°C to 40°C?
19. How many joules are needed to change the temperature of 15 g of water from 65°C to 95°C?
20. How many joules are needed to change the temperature of 40 g of water from 33°C to 23°C?
21. How many joules are needed to change the temperature of 25 g of water from 40°C to 100°C?
22. How many joules are needed to change the temperature of 22 g of water from 18°C to 33°C?
23. How many joules of heat are needed to change 23 grams of ice into liquid water at its melting point?
24. How many joules of heat must be removed from 56 grams of steam to change it into liquid water at its condensing point?

25. How many joules of heat must be removed from 2.00 kg of liquid water to turn it into ice at its freezing point?

26. Explain why sweating cools you off.

27. Define 'vapor pressure' and 'volitile.'

28. Describe the effect of strong and weak intermolecular forces on vapor pressure.

29. What is the 'flash point' of a liquid. What does this have to do with vapor pressure?

30. Refer to 'Table H' in your reference table to answer the following questions. Note: VP = vapor pressure

(a) Which has the lowest boiling point?
(b) Which has a boiling point of 100°C?
(c) Which has the highest boiling point?
(d) Which has the highest VP at 40°C?
(e) Which substance will boil at 79°C?
(f) At what temperature will alcohol boil when the atmospheric pressure is 50 kPa?
(g) At what atmospheric pressure will propanone boil at 20°C?
(h) At what pressure will water boil at 90°C?
(i) Which has the lowest VP at 70°C?
(j) As the pressure decreases, the boiling point of water (a) increases, (b) decreases, (c) remains the same.
(k) What is the VP of water at 60°C?