**Unit 2 HW 2: Specific Heat Capacity and Review**

1. 415 K = ? °C  142·C
2. 62.14°C = ? K  335.14K

3. 0 K = ? °C  −273·C
4. 0°C = ? K  273K

5. 25°C = ? K  298K
6. 1154 K = ? °C  881°C

7. There are several ways to separate a mixture: chromatography, distillation, and filtration. Look up definitions for each and decide which technique should be used to separate each mixture below:
   (a) A sample of sand and water  filtration
   (b) Ink in a marker  chromatography
   (c) Alcohol and water  distillation

8. If you had a sample of sand and salt water mixed together. You would  filter  to remove the sand and then  evaporate the water to leave only the salt.

9. Alicia's cheapskate boyfriend gave her a ring he claims is 24 carat gold. Alicia is skeptical. After chem class the next day she measures the mass of the ring, finds the volume of the ring by water displacement, and then calculates the density of the ring. Should she treasure the ring as his first truly generous gift to her, or throw it at him the next time he walks by? **Defend your answer.**

   DATA:

   Mass: 15.28 g
   Final volume: 43.7 mL
   Initial volume: 42.2 mL
   1.5 mL

   $\dfrac{15.28\,g}{1.5\,mL} = \dfrac{10.1}{10.9/mL}$

   gold's density is 19.32 g/mL

   ring ≠ pure

10. Rubbing alcohol has a density of 0.87 g/cm³. Calculate this density in pounds/gallon.

    $\dfrac{.87\,g}{1\,cm^3} \Big| \dfrac{1\,lb}{454\,g} \Big| \dfrac{1000\,mL}{1L} \Big| \dfrac{3.79L}{1\,gal} = 7.3\,lb/gal$

11. When a 9.5 gram sample of a substance absorbed 65 J of heat, its temperature rose from 15°C to 30.°C. What is the substance's specific heat capacity?

    $Q = m \times Cp \times \Delta T$
    $65J = 9.5g \times Cp \times 15°C$
    $Cp = .46\,J/g°C$

12. Calculate the amount of heat in kJ absorbed by a 4.5 gram piece of calcium that is heated from 25°C to 63°C. The specific heat capacity of calcium is 0.647 J/g°C.
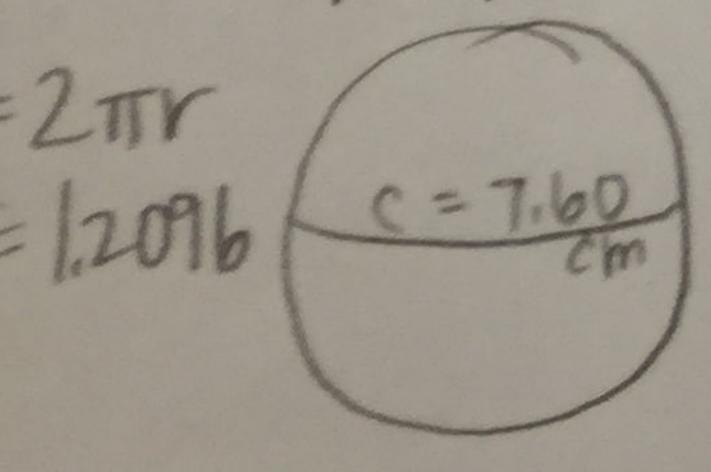
    $Q = m \times Cp \times \Delta T$
    $= 4.5g \times .647\,J/g°C \times (63-25°C)$
    $= 110J$
    $= 1270J$

13. 127 kJ of energy are applied to a sample of metal X weighing 45.0 g. The metal sample is initially at 21.0°C. Calculate the final temperature of the metal sample if the heat capacity of metal X is 4.25 J/g•°C.
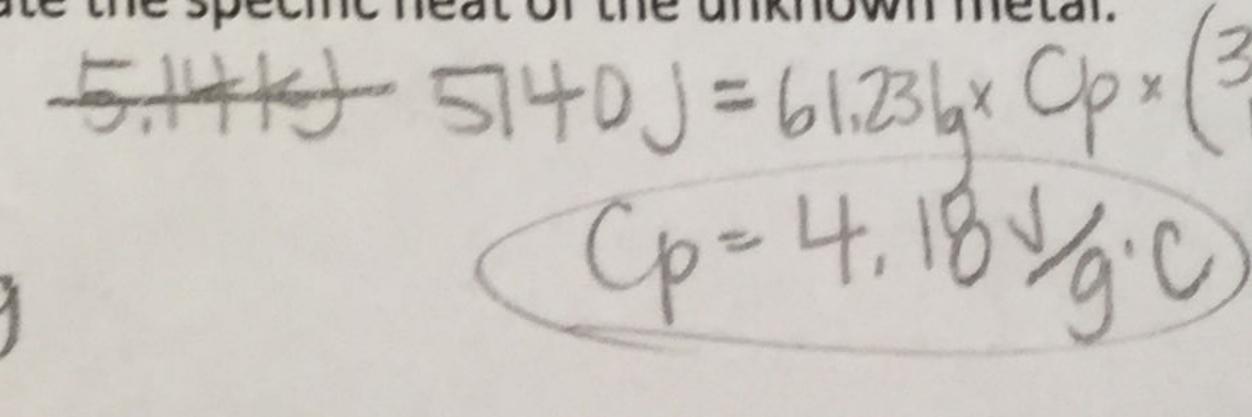
    $Q = m \times Cp \times \Delta T$
    $1270J = 45g \times 4.25\,J/g°C \times (x)$
    $x = 6.64°C$

    $21.0 + 6.64$
    $27.6°C$

14. A scientist finds a sphere of unknown metal in her laboratory. She measures the circumference of the sphere and finds it to be 7.60 cm. The density of the sphere is 8.26 g/cm³. When 5.14 kJ of energy are applied to this sphere, the temperature increases from 19.0°C to 39.1°C. Calculate the specific heat of the unknown metal.

    $= 2\pi r$
    $= 1.2096$
    C = 7.60 cm

    $D = 8.26\,g/cm^3 = \dfrac{m}{7.413\,cm^3}$
    $V = 4/3\pi r^3$
    $= 4/3\pi (1.2096)^3 = 7.413\,cm^3$
    $m = 61.231\,g$

    5.14kJ  $5140J = 61.231g \times Cp \times (3$
    $Cp = 4.18\,J/g·C$

15. Label each as element, a group of molecules, compound, heterogeneous mixture, homogeneous mixture.

Each circle represents an atom and each different color represents a different kind of atom. If two atoms are touching then they are bonded together.



1) _____    2) _____    3) _____

4) _____    5) _____    6) _____

7) _____    8) _____    9) _____

1) comp
2) homo
3) homo
4) homo
5) element
6) comp
7) molecules
8) hetero
9) homo

16. Is this chemical reaction, $2KClO_3 + 100$ kJ $\rightarrow 2KCl + 3O_2$, endothermic or exothermic? __endo__

17. In a reaction, the heat change is written as -400 kJ. What is does this mean? __exo / released__

18. Classify the following as physical (P) or chemical (C) changes:
   a. Copper pan acquires a blue-green coating C
   b. Hydrogen peroxide fizzes when put on a cut C
   c. Mothballs vaporize when in a cedar closet P
   d. Alcohol feels cool as it evaporates from skin P
   e. Soap lathers when you wash your hands P
   f. Acetone removes nail polish P
   g. Rubber stretches when you pull on it P
   h. Antacid tablets fizz when it comes in C contact with stomach acid

19. Classify the following as heterogeneous mixture (HT), homogeneous mixture (HM), or pure substance (PS):
   a. Milk HM
   b. gold PS
   c. Steel HM
   d. Mercury in a thermometer PS
   e. Bag of various colored marbles HT
   f. Beach sand HT
   g. Air in this room HM
   h. Carbon dioxide PS
   i. Gasoline HM
   j. Chunky peanut butter HT
   k. Distilled water PS
   l. kool-aid HM