CHM151 Quiz (1c) 25 Pts Fall 2005 Name: Key

**Show work to receive credit.** **Conversion factors:** centi (c) = $10^{-2}$, milli (m) = $10^{-3}$ , micro (μ) = $10^{-6}$, nano (n) = $10^{-9}$, pico (p) = $10^{-12}$, kilo (k) = $10^{3}$, 2.54 cm = 1 inch, 12 inches = 1 ft, 5280 ft = 1 mile, 60 s = 1 min, 60 min = 1 hr.

1. (4 Pts) Of the following, _____ is the greatest mass.
   a) 4.22 x $10^{8}$ mg $4.22 \times 10^{8} \times 10^{-3} g = 4.22 \times 10^{5} g$
   b) 6.83 x $10^{-5}$ mg $6.83 \times 10^{-5} \times 10^{-3} = 6.83 \times 10^{-8} g$
   c) 9.73 x $10^{9}$ pg $9.73 \times 10^{9} \times 10^{-12} g = 9.73 \times^{-3} g$
   d) 7.73 x $10^{-2}$ mg $7.73 \times 10^{-2} \times 10^{-3} g = 7.73 \times 10^{-5} g$
   e) 4.23 x $10^{8}$ pg $4.23 \times 10^{8} \times 10^{-12} g = 4.23 \times 10^{-4}$

2. (3 Pts) How many centimeters are in 430 picometers?

$$430 \cancel{pm} \left| \frac{10^{-12}}{\cancel{p}} \right| \frac{C}{10^{-2}} = 430 \times 10^{-10} cm$$

(c) $4.30 \times 10^{-8}$ cm

3. (3 Pts) The density of silver is 10.5 g/cm$^{-3}$. What volume (in cm$^3$ ) would be occupied by a piece of silver with a mass of 61.3 g?

$$61.3 \cancel{g} \left| \frac{cm^3}{10.5 \cancel{g}} \right. = 5.838 \, cm^3$$

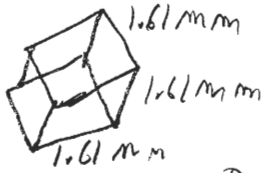
4. (3 Pts) Assume each of the following numbers are measurements. Perform the indicated calculations and report the answer to the proper number of significant figures.
   (3.15 x 1.06) + (21 x 1.773) = _____

$3.339 + 37.233 \Rightarrow$

$$\begin{array}{r} 3.339 \\ +\,37.233 \\ \hline 40.572 \end{array} \Rightarrow (41)$$

5. (4 Pts) A cube of an unknown metal measures 1.61 mm on one side. The mass of the cube is 36 mg. Which of the following is most likely the unknown metal? Support your answer with calculations.

| metal | density g/cm$^3$ |
|---|---|
| rhodium | 12.4 |
| copper | 8.96 |
| niobium | 8.57 |
| vanadium | 6.11 |
| zirconium | 6.51 |




$V = \ell \cdot w \cdot h$

$$V = \left( \frac{1.61 \times 10^{-3} m}{10^{-2}} \right)^3 = 0.00417 \, cm^3$$

$$D = \frac{36 \times 10^{-3} g}{0.00417 \, cm^3} = 8.622 \, g/cm^3$$

6. (4 Pts) 65 m/s = _____ km/hr?

$$\frac{65 \, m}{\cancel{s}} \left| \frac{3600 \cancel{s}}{hr} \right| \frac{k}{10^{3}} = \frac{234 \, km}{hr}$$

7. (4 Pts) An ore sample contains 0.37% gold and 1.25% silver. How many mg of silver can be recovered from 14.0 kg of ore?

$$14.0 \times 10^{3} g \, \cancel{ore} \left| \frac{1.25 \, Ag}{100 \, \cancel{ore}} \right| \frac{m}{10^{-3}} = 175{,}000 \, mg \, Ag$$

CHM151 Quiz 1d 25 Pts Fall 2005 Name: Key

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1. (4 Pts) Of the following, e is the greatest mass.
   a) $4.23 \times 10^{8}$ pg
   b) $7.73 \times 10^{-2}$ mg
   c) $6.83 \times 10^{-5}$ mg
   d) $9.73 \times 10^{9}$ pg
   e) $4.22 \times 10^{5}$ mg

"Add powers"

$4.23 \times 10^{8} \times 10^{-12}\ g = 4.23 \times 10^{-4}\ g$ → $7.73 \times 10^{-5}\ g$

$6.83 \times 10^{-8}\ g$

$9.73 \times 10^{-3}\ g$ → $4.22 \times 10^{5}\ g$

2. (4 Pts) 65 m/s = _____ km/hr?

$$\frac{65\ m}{s} \left| \frac{k}{10^{3}} \right| \frac{3600\ s}{hr} = \frac{234\ km}{hr}$$

3. (3 Pts) The density of silver is 10.5 $g/cm^{-3}$. What volume (in $cm^3$ ) would be occupied by a piece of silver with a mass of 91.3 g?

$$\frac{91.3\ g}{10.5\ g} \left| \frac{cm^3}{} \right. = 8.695\ cm^3$$

4. (3 Pts) Assume each of the following numbers are measurements. Perform the indicated calculations and report the answer to the proper number of significant figures.
   (3.15 x 1.06) + (21 x 1.773) = _____

$3.339 + 37.233 \Rightarrow 3.339$

$37.233$

$40.572 \Rightarrow 41$

5. (4 Pts) A cube of an unknown metal measures 1.61 mm on one side. The mass of the cube is 36 mg. Which of the following is most likely the unknown metal? Support your answer with calculations.

| metal | density g/cm,, |
|---|---|
| rhodium | 12.4 |
| copper | 8.96 |
| niobium | 8.57 |
| vanadium | 6.11 |
| zirconium | 6.51 |

See Key 1c

6. (3 Pts) How many centimeters are in 630 picometers?

$$\frac{630 \times 10^{-12}\ m}{10^{-2}} \left| \frac{C}{} \right. = 630 \times 10^{-10}\ cm$$

or $6.3 \times 10^{-8}\ cm$

7. (4 Pts) An ore sample contains 0.37% gold and 1.25% silver. How many mg of gold can be recovered from 24.0 kg of ore?

$$\frac{24.0\ kg\ ore}{100\ ore} \left| \frac{0.37\ Au}{k} \right| \frac{10^{3}}{m} \left| \frac{m}{10^{-3}} \right. = 8880\ mg\ Au$$