

# Ch. 11.1 + 11.2 exercises 1-26

1)  $\pm 0.5 \text{ cm}^3$

2)  $9.92 \pm 0.05 \text{ g} \rightarrow \text{max-min} = 9.97 - 9.87 \text{ g}$   
found:  $10.1 \pm 0.2 \text{ g} \rightarrow \text{max-min} = 10.3 \text{ g} - 9.9 \text{ g}$   
yes, it is possible this is the missing diamond.

3) a)  $4 \times 10^{-2} \text{ g}$   
b)  $2.22 \times 10^2 \text{ cm}^3$   
c)  $3.0 \times 10^{-2} \text{ g}$   
d)  $3 \times 10^1 \text{ g}$

4) a)	4 sig. figs.	15.50
b)	2	150
c)	3	0.0123
d)	4	150.0

5) I. random errors = A

6)  $58.5357 \text{ kJ mol}^{-1} \pm 2\%$        $2\% \rightarrow 1.17 \text{ kJ/mol}$  or  $1 \text{ kJ/mol}$   
 $58 \pm 1 \text{ kJ mol}^{-1}$   
A  $\rightarrow 59 \text{ kJ mol}^{-1}$

7) B precision should be good, accuracy will be off.  
(reproducible)

8) B

9) A

10) D

11) they are precise but not accurate. Reproducible but consistently inaccurate. (C)

12) 48.8, 48.9, 49.0, 49.1, 49.2  $\pm 0.1$ s  
49.0  $\pm 0.5$ s

13) 1.40  $\pm 0.05$ K and -0.65  $\pm 0.05$ K (B)  
-0.65 - 1.40 = 2.05  $\pm 0.1$ K

14) 30.0°C  $\rightarrow$  50.0°C  $\pm 0.5$ °C  
~~50.0 - 30.0 = 20.0°C  $\pm 1.0$ °C  $\rightarrow$  20.0  $\pm 1$ °C~~  
 $\left. \begin{array}{l} \frac{0.5}{30} \times 100 = 1.67\% \\ \frac{0.5}{50} \times 100 = 1\% \end{array} \right\} = 3\%$       20.0  $\pm 3\%$  °C (C)

15) B

16) 1.652g / 1.1 cm<sup>3</sup> g/cm<sup>3</sup> =  $\frac{1.652\text{g}}{1.1\text{cm}^3} = 1.5\text{g cm}^{-3}$  (B)

17)  $\begin{array}{r} 11.6235\text{g} \\ + 10.5805\text{g} \\ \hline \end{array} = 22.2040\text{g} = 6\text{ s.f.}$  (D)

18) % loss =  $\frac{0.266 - 0.186}{0.266} \times 100 = 30.1\%$  (B)  
30.1%

19)  $\frac{0.020\text{g}}{20\text{s}} = 0.001\text{g s}^{-1}$       0.0010  $\pm 0.0001\text{g s}^{-1}$  (C)  
 $\left. \begin{array}{l} \frac{0.001\text{g}}{0.020\text{g}} = \pm 0.05\text{g } 5\% \\ \frac{1}{20} = \pm 0.05\text{s } 5\% \end{array} \right\} 0.10 = 10\%$       0.10  $\times 0.0010 = \pm 0.0001\text{g s}^{-1}$

20)  $C = \frac{n}{V}$   $C = 1.00 \pm 0.05 \text{ mol dm}^{-3}$   
 $V = 10.0 \pm 0.1 \text{ cm}^3 \rightarrow 0.0100 \pm 0.0001 \text{ dm}^3$

$n = CV$   
 $n = (1.00)(0.0100) = 0.0100 \text{ mol}$

$\pm : \frac{0.05}{1.00} \times 100 = 5\%$   
 $\frac{0.0001}{0.0100} \times 100 = 1\%$  } 6%  $0.06 \times 0.0100 \text{ mol} = \pm 0.0006$

$0.0100 \pm 0.0006 \text{ mol}$

21) OMIT

22) B

23) aluminum =  $2.70 \text{ g cm}^{-3}$   
 iron =  $7.86 \text{ g cm}^{-3}$   
 copper =  $8.92 \text{ g cm}^{-3}$   
 Zinc =  $7.14 \text{ g cm}^{-3}$

$\pm 0.002$

aluminum errors are consistently up/down

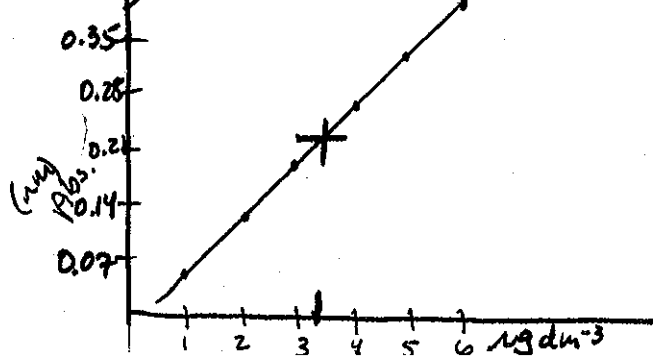
$\frac{40}{10} = 4.00$   $\frac{60}{20} = 3.00$   $\frac{90}{30} = 3.00$   $\frac{110}{40} = 2.75$   $\frac{140}{50} = 2.80$   $\frac{160}{60} = 2.67$

$\frac{190}{70} = 2.71$   $\frac{210}{80} = 2.63$   $\frac{245}{90} = 2.72$

24) distilled  $\text{H}_2\text{O}$  should be (accepted value) is 7.0  
 so measurements are precise but not accurate.

(B)

25) concentration = compare sample to slope of graph. (best-fit)



$3.25 \pm 0.05 \text{ ng dm}^{-3}$   
 (approx. answer)

26) OMIT