Name: _____ Block: __ Date: _____

Chapters 3 and 4 Review

Test format: 10 multiple choice, 5 vocabulary matching, short answer: 3 significant figures, 6 scientific notation, 3 standard calculations, and 3 temperature conversions, word problems: 3 percent error, 4 density, and 5 dimensional analysis.

DIRECTIONS: Read each question carefully and choose the best answer.

A **1.**

Trial	Mass (g)	Volume (cm^3)	Density (g/cm^3)
1	14.5	2.52	5.75
2	28.3	4.80	5.90
3	33.1	5.75	5.76
4	55.4	9.62	5.76

A team of chemistry students made the above measurements and density calculations of the same type of material. The accepted value (true value) of the density of the material is 5.72 g/cm^3. Which trial has the least amount of absolute error?

A 1
B 2
C 3
D 4

D **2. A student measures the mass of a piece of copper three times and records the results in the following table:**

Trial	Mass (grams)
1	26.5
2	26.4
3	26.5

The actual mass of the copper is 26.5 grams. Which of the following is demonstrated in the student's data?

A Accuracy
B Reliability
C Precision
D Accuracy and Precision

A **3. How is 0.0049 expressed in proper scientific notation?**

A 4.9×10^{-3}
B 0.49×10^{-2}
C 4.9
D 4.9×10^{3}

C 4. **The melting point of a white solid substance was determined in four repeated trials to be 56.0° C, 55.0° C, 57.5° C, 55.5° C. What temperature should be reported as the melting point as a result of these trials?**

A 55.0° C
B 55.5° C
→ **C** 56.0° C
D 57.5° C

Add together then divide by 4

C 5. **The density of an unknown metal was determined to be 2.85 g/mL. The actual density was 2.70 g/mL. What is the percent error in this determination?**

A 0.056%
B 0.15%
→ **C** 5.6%
D 94.4%

$\left|\frac{(2.85\ g/ml - 2.70\ g/ml)}{2.70\ g/ml}\right| \times 100 =$

problem wrong # of sf and label should be % error

B 6. **How many liters are equivalent to five milliliters?**

A 0.005 L
→ **B** 0.05 L
C 500 L
D 5000 L

$5ml \times \frac{1L}{1000ml} =$

C 7.

Gas Volume Data

Trial	Measured Volume (L)
1	5.20
2	5.20
3	5.19
4	5.20
5	5.20

The following data were collected. The volume of the gas is known to be 2.20 L. This data reflects —

A low precision and low accuracy
B low precision and high accuracy
→ **C** low accuracy and high precision
D high accuracy and high precision

Express the number of significant figures in the following numbers.

8.. 0.00765 3

9. 2.109 4

10. 124.00 5

11. 404.006 6

12. 0.000320 3

13. 897000000 3

Convert the following numbers into scientific notation.

14. 546.7 5.467×10^2

15. 0.0000623 6.23×10^{-5}

16. 89600000 8.96×10^7

17. 0.00548 5.48×10^{-3}

18. 1.0875 1.0875×10^0

19. 431 4.31×10^2

Convert the following scientific notations back into decimal form.

20. 4.173×10^{-3} 0.004173

21. 8.6004×10^2 860.04

22. 9.00×10^{-4} 0.000900

Perform the following calculations. (keep significant figures in mind)

23. $(1.23 \times 10^7) + (1.54 \times 10^5)$ controls sf — Cut off at hundredths — ans.: 1.25×10^7

24. $(3.21 \times 10^{-1}) - (5.84 \times 10^{-3})$ control sf — Cut off at hundredths — ans.: 3.15×10^{-1}

25. $\frac{(7.0 \times 10^{-3})(3.0 \times 10^7)}{(5.0 \times 10^{-2})}$ all have 2sf — ans.: 4.2×10^6

°C + 273 = K K − 273 = °C

Please convert the following temperatures.

26. 439°C = 712 K

27. 20.7°C = 293.7 K

28. 597K = 324 °C

$\left|\frac{(M-A)}{A}\right| \times 100$

Determine the percent error for the following.

29. A rod is known to have a mass of 49.6g, the student has determined the mass to be 46.2g. (3sf)

$\left|\frac{(46.2g - 49.6g)}{49.6g}\right| \times 100 = 6.85\%$ error

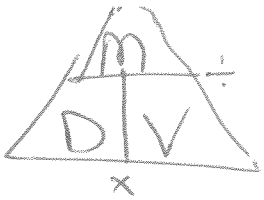
30. A volume of liquid is known to be 109.82ml, the student has measured the volume to be 99.89ml. (4sf)

$\left|\frac{(99.89ml - 109.82ml)}{109.82ml}\right| \times 100 = 9.042\%$ error

31. The time required for a reaction to come to completion is known to be 3.28 sec., the student has clocked the reaction time as 3.19 sec. (3sf)

$\left|\frac{(3.19sec - 3.28sec)}{3.28sec}\right| \times 100 = 2.74\%$ error

$D = \frac{m}{V}$



Perform the following density calculations on your answer sheet, remembering significant figures and labels.

32. What is the volume of a substance with a mass of 18.09g and a density of 2.790 g/cm^3?

(4sf) $V = \frac{m}{D} = \frac{18.09\text{g}}{2.790\text{g/cm}^3} = 6.484\text{ cm}^3$

33. What is the density of a substance with a mass of 52g and a volume of 301ml?

(2sf) $D = \frac{m}{V} = \frac{52\text{g}}{301\text{ml}} = 0.17\text{g/ml}$

34. What is the mass of a substance with a volume of 14.4cm^3 and a density of 10.86 g/cm^3?

(3sf) $m = D \cdot V = (10.86\text{g/cm}^3)(14.4\text{cm}^3) = 156\text{g}$

Complete the following conversion problems.

35. 4.00 hr to sec — ans.: 1.44×10^4 sec

(3sf) $4.00\text{hr} \times \frac{60\text{ min}}{1\text{ hr}} \times \frac{60\text{sec}}{1\text{ min}} =$

36. 9.3 kg to μg — ans.: 9.3×10^9 μg

(2sf) $9.3\text{kg} \times \frac{1000\text{g}}{1\text{kg}} \times \frac{1000000\mu\text{g}}{1\text{g}} =$

37. 4.0 L to dm^3 — ans.: 4.0 dm^3

(2sf) $4.0\text{L} \times \frac{1000\text{ml}}{1\text{L}} \times \frac{1\text{cm}^3}{1\text{ml}} \times \frac{1\text{dm}^3}{1000\text{cm}^3}$ see below

38. 750 cm^3 to liters — ans.: 0.75 L

(2sf) $760\text{ cm}^3 \times \frac{1\text{ml}}{1\text{cm}^3} \times \frac{1\text{L}}{1000\text{ml}} =$

39. 55 in/hr to cm/sec — ans.: 0.039 $\frac{\text{cm}}{\text{sec}}$

(2sf) $\frac{55\text{in}}{\text{hr}} \times \frac{2.54\text{cm}}{1\text{in}} \times \frac{1\text{hr}}{60\text{min}} \times \frac{1\text{min}}{60\text{sec}} =$

40. 95 km/hr to m/sec — ans.: 26 $\frac{\text{m}}{\text{sec}}$

(2sf) $\frac{95\text{km}}{\text{hr}} \times \frac{1000\text{m}}{1\text{km}} \times \frac{1\text{hr}}{60\text{min}} \times \frac{1\text{min}}{60\text{sec}} =$

1dm = 10cm so $\frac{1\text{dm}}{10\text{cm}}$ cubed $\rightarrow \frac{1\text{dm}^3}{1000\text{cm}^3}$