Test 1 Practice—Fundamentals of Chemistry

Scientific Method

In chemistry class, Allen determined the effectiveness of various metals in releasing hydrogen gas from hydrochloric acid. Several weeks later, Allen read that a utilities company was burying lead next to iron pipes to prevent rusting. Allen conjectured that less rusting would occur with the more active metals. He placed the following into 4 separate beakers of water: (a) 1 iron nail, (b) 1 iron nail wrapped with an aluminum strip, (c) 1 iron nail wrapped with a magnesium strip, and (d) 1 iron nail wrapped with a lead strip. He used the same amount of water, equal amounts (mass) of the metals, and the same type of iron nails. At the end of 5 days, he rated the amount of rusting as small, moderate, or large. He also recorded the color of the water.

Identify the:

1. Problem Will active metals prevent rusting?
2. Hypothesis Less rusting from more active metals
3. Independent variable Different metals
4. Dependent variable Amount of rust
5. Control group (a) iron nail
6. Observations Amount of rust, color of water
7. Constants Amount of water, mass of metals, type of nails

Scientific notation: Put the following in correct scientific notation

8. 56 000 000 000 5.6×10^{10}
9. 0.000 98 9.8×10^{-4}
10. 0.198 765 1.98765×10^{-1}

Scientific notation: Answer each in correct scientific notation:

11. $(7.6 \times 10^{-11})(6.1 \times 10^{9})$ 4.6×10^{-1}

12. $\dfrac{3.58 x 10^{-12}}{6.0 x 10^{8}}$ 6.0×10^{-21}

13. $8.9 \times 10^{7} - 2.1 \times 10^{5}$ 8.9×10^{7}

14. $3.29 \times 10^{4} + 1.21 \times 10^{5}$ 1.54×10^{5}

15. $(9.8 \times 10^{-34})(7 \times 10^{14})$ 7×10^{-19}

16. $\dfrac{5.6x10^{8}}{3.19x10^{12}}$ 1.8x10⁻⁴

Significant figures: How many sig figs are in the following numbers:

17. 608 cm 3
18. 200 kg 1
19. 0.007 00 m 3
20. 310.000 000 pg 9

Sig figs: Answer the following calculations with the correct sig figs:

21. 4.5m * 3.00 m 14 m²
22. 8.700cm/3.2 cm 2.7
23. 7.80 m + 4 m + 78.2 m 90 m
24. 0.64 mm – 4.3 mm - 0.200 mm -3.9 mm

Conversions:

25. How many micrograms are in 45.6 kilograms? 4.56x10¹⁰ µg
26. How many meters are in 1050 cm? 10.5 m
27. Convert 35.38 mL to L. .03538 L
28. How many inches are in 4.5x10⁻⁴ miles? (5280 ft = 1 mi) 29 in
29. Convert 50 km/hr to cm/s. 1000 cm/s
30. The speed limit on I-25 through Castle Rock is 65 mi/hour. Convert this to m/s. (1 mi = 1.61 km) 29 m/s
31. If I drive at 45 mi/hr, how many minutes will it take me to drive 60 miles? 80 min
32. The speed of light is 3.0x10⁸ m/s. How many hours does it take light to travel 1.2x10⁵ km? 1.1x10⁻⁴ hr
33. How many seconds are in one century? (1 century = 100 years, 1 year = 365 days) 3x10⁹ s
34. The earth has a volume of 1.08x10¹² km³. How many cubic centimeters is this? 1.08x10²⁷ cm³
35. A bowling ball has a volume of 5300 cm³. Determine the volume in cubic meters. 5.3x10⁻³ m³

Measurement:

Practice measuring different objects with:

36. Graduated cylinders Measurements made with 100 mL, 50 mL grad cyl should have 1 decimal place. Measurements made with 10 mL grad cyl should have 2 decimal places; Measurements made with 50 mL and 100 mL grad cyl should have 1 decimal place
37. Rulers Measurements should have 2 decimal places
38. Triple beam balance 2 decimal places in mass