

Do Now Questions

- During a laboratory activity, a student combined two solutions. In the laboratory report, the student wrote "A yellow color appeared." The statement represents the student's recorded
A) conclusion B) observation
C) hypothesis D) inference
- A student investigated the physical and chemical properties of a sample of an unknown gas and then identified the gas. Which statement represents a conclusion rather than an experimental observation?
A) The gas is colorless.
B) The gas is carbon dioxide.
C) When the gas is bubbled into limewater, the liquid becomes cloudy.
D) When placed in the gas, a flaming splint stops burning.
- Which of the following statements contained in a student's laboratory report is a conclusion?
A) A gas is evolved.
B) The gas is insoluble in water.
C) The gas is hydrogen.
D) The gas burns in air.
- A Bunsen burner flame is sooty black and mixed with an orange-yellow color. Which is the probable reason for this condition?
A) No oxygen is mixing with the gas.
B) No gas is mixing with the oxygen.
C) Insufficient oxygen is mixing with the gas.
D) Insufficient gas is mixing with the oxygen.
- Which Kelvin temperature is equal to 200.°C?
A) -73 K B) 73 K
C) 200. K D) 473 K
- A sample of an element has a mass of 34.261 grams and a volume of 3.8 cubic centimeters. To which number of significant figures should the calculated density of the sample be expressed?
A) 5 B) 2 C) 3 D) 4
- A temperature of 37°C is equivalent to a temperature of
A) 98.6 K B) 236 K
C) 310. K D) 371 K
- A student calculates the density of an unknown solid. The mass is 10.04 grams, and the volume is 8.21 cubic centimeters. How many significant figures should appear in the final answer?
A) 1 B) 2 C) 3 D) 4
- Which mass measurement contains four significant figures?
A) 0.086 g B) 0.431 g
C) 1003 g D) 3870 g
- Expressed to the correct number of significant figures, the sum of two masses is 445.2 grams. Which two masses produce this answer?
A) 210.10 g + 235.100 g
B) 210.100 g + 235.10 g
C) 210.1 g + 235.1 g
D) 210.10 g + 235.10 g
- Which quantity is equivalent to 50 kiloJoules?
A) 5000 J B) 0.05 J
C) 5×10^3 J D) 5×10^4 J
- One kiloJoule is the same as
A) 0.001 Joule B) 0.01 Joule
C) 100 Joules D) 1,000 Joules
- Which measurement contains a total of three significant figures?
A) 0.12 B) 012 C) 120 D) 120.
- What is the quotient of 8.01 grams divided by 3.127 grams, expressed to the correct number of significant figures?
A) 2.6 B) 2.56
C) 2.562 D) 2.5616
- The accepted value for the percent by mass of water in a hydrate is 36.0%. In a laboratory activity, a student determined the percent by mass of water in the hydrate to be 37.8%. What is the percent error for the student's measured value?
A) 5.0% B) 4.8%
C) 1.8% D) 0.05%

Do Now Questions

16. A student found the boiling point of a liquid to be 80.4°C . If the liquid's actual boiling point is 80.6°C , the experimental percent error is equal to

A) $\frac{80.6 - 80.4}{80.6} \times 100$

B) $\frac{80.6 - 80.4}{80.4} \times 100$

C) $\frac{80.5 - 80.4}{80.5} \times 100$

D) $\frac{80.5 - 80.4}{80.4} \times 100$

17. A student wishes to prepare approximately 100 milliliters of an aqueous solution of 6 M HCl using 12 M HCl. Which procedure is correct?

- A) adding 50 ml of 12 M HCl to 50 ml of water while stirring the mixture steadily
- B) adding 50 ml of 12 M HCl to 50 ml of water, and then stirring the mixture steadily
- C) adding 50 ml of water to 50 ml of 12 M HCl while stirring the mixture steadily
- D) adding 50 ml of water to 50 ml of 12 M HCl, and then stirring the mixture steadily

18. Which activity is considered a proper laboratory technique?

- A) heating the contents of an open test tube held vertically over a flame
- B) heating the contents of a test tube that has been closed with a stopper
- C) adding water to concentrated acids
- D) adding concentrated acids to water

19. Base your answer to the following question on the information below and on your knowledge of chemistry.

During a laboratory activity, a student places 25.0 mL of $\text{HCl}(\text{aq})$ of unknown concentration into a flask. The student adds four drops of phenolphthalein to the solution in the flask. The solution is titrated with 0.150 M $\text{KOH}(\text{aq})$ until the solution appears faint pink. The volume of $\text{KOH}(\text{aq})$ added is 18.5 mL.

Describe *one* laboratory safety procedure that should be used if a drop of the $\text{KOH}(\text{aq})$ is spilled on the arm of the student.

Do Now Questions

20. Base your answer to the following question on the information below.

A student, wearing chemical safety goggles and a lab apron, is to perform a laboratory test to determine the pH value of two different solutions. The student is given one bottle containing a solution with a pH of 2.0 and another bottle containing a solution with a pH of 5.0. The student is also given six dropping bottles, each containing a different indicator listed in Reference Table *M*.

State *one* safety precaution, *not* mentioned in the passage, that the student should take while performing tests on the samples from the bottles.

Base your answers to questions **21** through **23** on the information below.

A method used by ancient Egyptians to obtain copper metal from copper(I) sulfide ore was heating the ore in the presence of air. Later, copper was mixed with tin to produce a useful alloy called bronze.

21. A 133.8-gram sample of bronze was 10.3% tin by mass. Determine the total mass of tin in the sample.

22. Convert the melting point of the metal obtained from copper(I) sulfide ore to degrees Celsius.

23. Calculate the density of a 129.5-gram sample of bronze that has a volume of 14.8 cubic centimeters. Your response must include a correct numerical setup and the calculated result.
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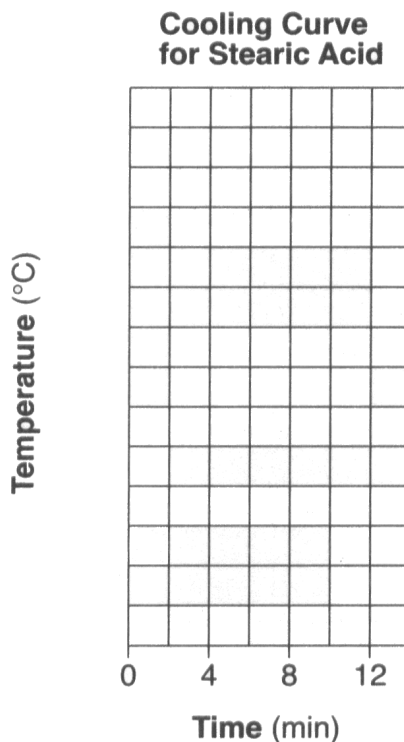
Do Now Questions

24. Based on data collected during a laboratory investigation, a student determined an experimental value of 322 joules per gram for the heat of fusion of H₂O. Calculate the student's percent error. Your response must include a correct numerical setup and the calculated result.
25. Base your answer to the following question on the information and chart below.

A 150.-gram liquid sample of stearic acid, C₁₇H₃₅COOH, is cooled at a constant rate. The temperature of the sample is recorded at 2-minute intervals in the data table below.

Cooling Data for Stearic Acid

Time (min)	Temperature (°C)
0	75.0
2	72.0
4	69.3
6	69.3
8	69.3
10.	69.3
12	65.0



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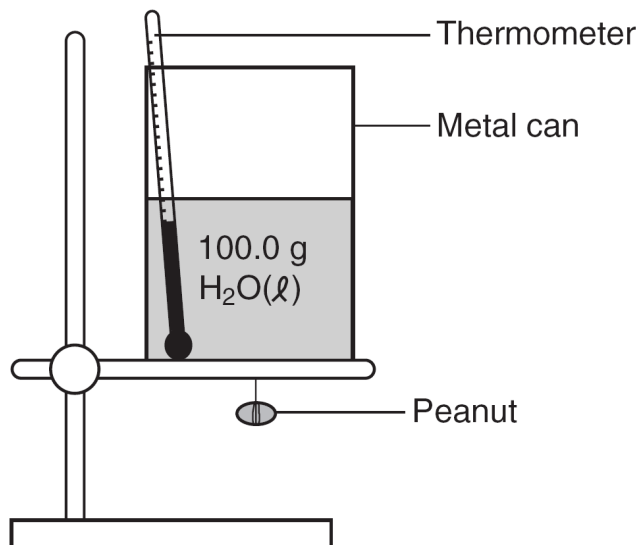
- Mark an appropriate scale on the axis labeled “Temperature (°C).”
- Plot the data from the data table. Circle and connect the points.

Do Now Questions

26. Base your answer to the following question on the information below.

A student performed an experiment to determine the total amount of energy stored in a peanut. The accepted value for the energy content of a peanut is 30.2 kilojoules per gram. The student measured 100.0 grams of water into a metal can and placed the can on a ring stand, as shown in the diagram below. The peanut was attached to a wire suspended under the can.

The initial temperature of the water was recorded as 22.0° C. The peanut was ignited and allowed to burn. When the peanut finished burning, the final water temperature was recorded as 57.0° C. The student's experimental value for the energy content of this peanut was 25.9 kilojoules per gram.



Determine the student's percent error for the energy content of this peanut.

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27. A student determines the density of zinc to be 7.56 grams per milliliter. If the accepted density is 7.14 grams per milliliter, what is the student's percent error?

- Show a correct numerical setup.
 - Record your answer.
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