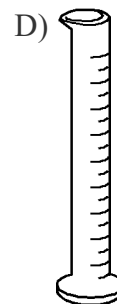
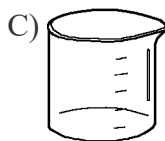
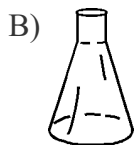
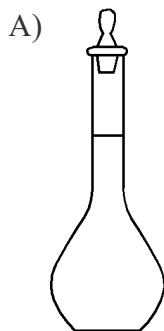
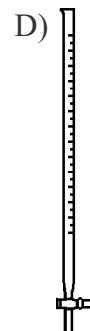
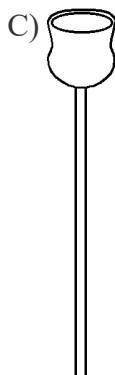
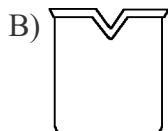
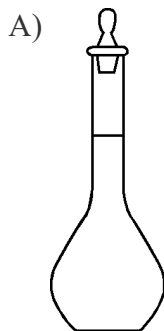


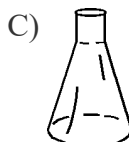
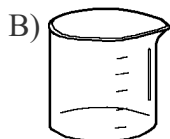
- 10) According to an accepted chemistry reference, the heat of vaporization of water is 2,260 joules per gram. A student determined in the laboratory that the heat of vaporization of water was 2,590 joules per gram. What is the percent error of the student's result?
- A) 12.7 B) 80.0 C) 14.6 D) 87.3
- 11) In the laboratory, a student determined the percent by mass of water in a hydrated salt to be 17.3 percent. What is the percent error if the accepted value is 14.8 percent?
- A) 16.9% B) 2.50% C) 5.92% D) 27.1%
- 12) Using atomic masses given in the *Periodic Table of the Elements*, the molecular mass for $\text{O}_2(\text{g})$ is 32.0. By experiment a student measured the mass of $\text{O}_2(\text{g})$ to be 28.0. What is the percent error in the student's result?
- A) 14.3% B) 1.43% C) 12.5% D) 1.25%
- 13) A laboratory experiment was performed to determine the percent by mass of water in a hydrate. The accepted value is 36.0% water. Which observed value has an error of 5.00%?
- A) 31.0% water B) 37.8% water C) 41.0% water D) 36.0% water
- 14) Which figure represents an Erlenmeyer flask?



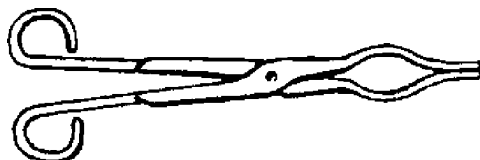
- 15) Which device should be used to accurately measure a volume of 16.30 milliliters?



16) Which diagram represents a crucible?



17) Which piece of laboratory equipment is represented by the diagram below?



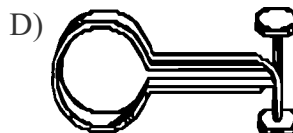
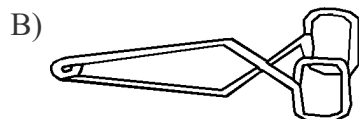
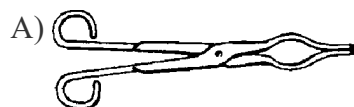
A) pinch clamp

B) test tube clamp

C) crucible tongs

D) beaker tongs

18) Which diagram represents a test tube holder (clamp)?



19) Which laboratory glassware is shown in the diagram below?



A) Erlenmeyer flask

B) distilling flask

C) Florence flask

D) volumetric flask

20) Which piece of laboratory apparatus would *most* likely be used to evaporate a 1-milliliter sample of a solution to dryness?

A) buret

B) pipette

C) volumetric flask

D) watch glass

21) A bunsen burner flame is sooty black and mixed with an orange-yellow color. Which one of the following is the probable reason for this condition?

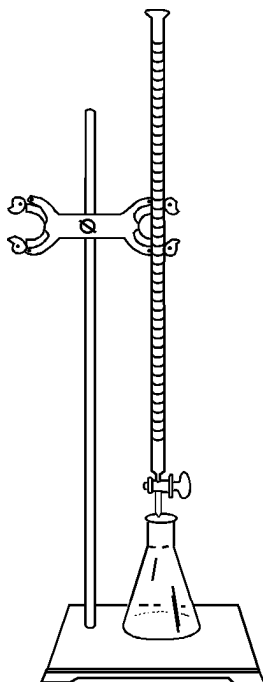
A) Insufficient oxygen is mixing with the gas.

C) Insufficient gas is mixing with the oxygen.

B) No gas is mixing with the oxygen.

D) No oxygen is mixing with the gas.

22) What laboratory procedure uses the equipment shown in the diagram below?



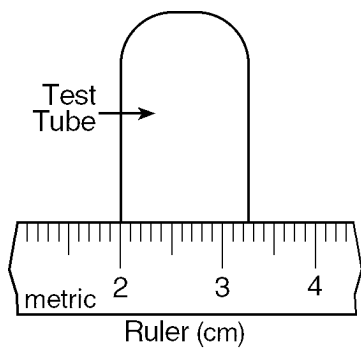
A) condensation

B) titration

C) evaporation

D) distillation

23) A student has to measure the diameter of a test tube in order to calculate the tube's volume.



Based on the diagram above, the tube's diameter is *closest* to

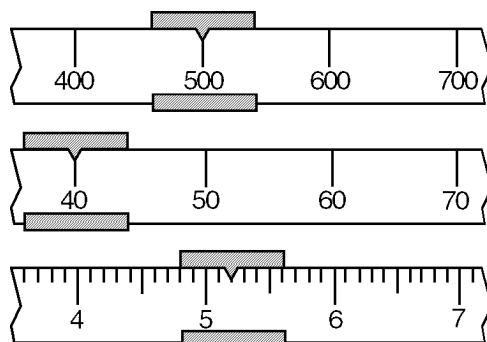
A) 12.5 cm

B) 3.25 cm

C) 1.25 cm

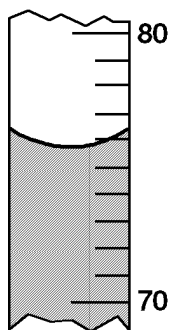
D) 2.32 cm

- 24) The diagram below represents a portion of a triple-beam balance.



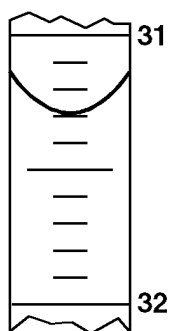
If the beams are in balance with the riders in the positions shown, what is the total mass of the object?

- A) 540.20 g B) 540.52 g C) 545.52 g D) 545.20 g
- 25) The diagram below shows a section of a 100-milliliter graduated cylinder.



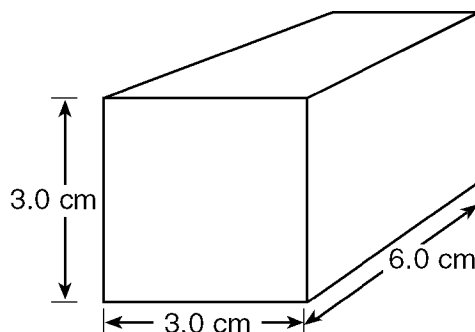
When the meniscus is read to the correct number of significant figures, the volume of water in the cylinder would be recorded as

- A) 84.30 mL B) 75.70 mL C) 84.3 mL D) 75.7 mL
- 26) The diagram below shows a portion of a buret. What is the reading of the meniscus?



- A) 32.72 mL B) 32.28 mL C) 31.72 mL D) 31.28 mL

- 27) The solid block shown below has a mass of 146 grams.



What is the block's density?

- A) 2.7 g/cm^3 B) 0.37 g/cm^3 C) 54 g/cm^3 D) 8.1 g/cm^3
- 28) A cube has a volume of 8.0 cm^3 and a mass of 21.6 grams. The density of the cube, in grams per cubic centimeter, is *best* expressed as
- A) 2.70 B) 0.370 C) 2.7 D) 0.37
- 29) To determine the density of an irregularly shaped object, a student immersed the object in 21.2 milliliters of H_2O in a graduated cylinder, causing the level of the H_2O to rise to 27.8 milliliters. If the object had a mass of 22.4 grams, what was the density of the object?
- A) 3.4 g/mL B) 27.8 g/mL C) 6.6 g/mL D) 3.0 g/mL
- 30) The length of a block of metal is 5.5 cm, its width is 1.25 cm, and its height is 8.75 cm. What is the volume of the block expressed to the correct number of significant figures?
- A) 60 cm^3 B) $60. \text{ cm}^3$ C) 60.16 cm^3 D) 60.2 cm^3
- 31) A student reacted 0.001.0 mole of Mg(s) completely according to the equation $\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$. He collected the $\text{H}_2\text{(g)}$ in a eudiometer. What volume of $\text{H}_2\text{(g)}$, collected to STP conditions, did he collect?
- A) 2.40 mL B) 22.4 mL C) 2.00 mL D) 11.2 mL
- 32) What occurs as potassium nitrate is dissolved in a beaker of water, indicating that the process is endothermic?
- A) The temperature of the solution increases. C) The temperature of the solution decreases.
B) The solution changes color. D) The solution gives off a gas.
- 33) A student is filtering a mixture of sand and salt water into a beaker. What will be found in the beaker after the filtration is completed?
- A) sand and salt B) sand, only C) salt, only D) salt and water

- 34) Salt *A* and salt *B* were dissolved separately in 100-milliliter beakers of water. The water temperatures were measured and recorded as shown in the table below.

	<u>SALT A</u>	<u>SALT B</u>
Initial water temperature:	25.1°C	25.1°C
Final water temperature:	30.2°C	20.0°C

Which one of the following statements is a correct interpretation of these data?

- A) The dissolving of both salt *A* and salt *B* was endothermic.
 - B) The dissolving of only salt *B* was exothermic.
 - C) The dissolving of only salt *A* was endothermic.
 - D) The dissolving of salt *A* was exothermic and the dissolving of salt *B* was endothermic.
- 35) Which one of the following statements contained in a student's laboratory report is a conclusion?
- A) The gas is hydrogen.
 - B) The gas burns in air.
 - C) A gas is evolved.
 - D) The gas is insoluble in water.

Question 36 refers to the following:

Given the chemistry reference table below:

Table of Solubilities in Water

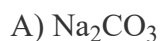
i — nearly insoluble ss — slightly soluble s — soluble d — decomposes n — not isolated	acetate	bromide	carbonate	chloride	chromate	hydroxide	iodide	nitrate	phosphate	sulfate	sulfide
Aluminum	ss	s	n	s	n	i	s	s	i	s	d
Ammonium	s	s	s	s	s	s	s	s	s	s	s
Barium	s	s	i	s	i	s	s	s	i	i	d
Calcium	s	s	i	s	s	ss	s	s	i	ss	d
Copper II	s	s	i	s	i	i	n	s	i	s	i
Iron II	s	s	i	s	n	i	s	s	i	s	i
Iron III	s	s	n	s	i	i	n	s	i	ss	d
Lead	s	ss	i	ss	i	i	ss	s	i	i	i
Magnesium	s	s	i	s	s	i	s	s	i	s	d
Mercury I	ss	i	i	i	ss	n	i	s	i	ss	i
Mercury II	s	ss	i	s	ss	i	i	s	i	d	i
Potassium	s	s	s	s	s	s	s	s	s	s	s
Silver	ss	i	i	i	ss	n	i	s	i	ss	i
Sodium	s	s	s	s	s	s	s	s	s	s	s
Zinc	s	s	i	s	s	i	s	s	i	s	i

- 36) According to the given table, which compound mixed with sand could be separated from the sand by following the three steps below?

STEP 1: Add water to the mixture of the compound and sand.

STEP 2: Filter the mixture of the compound and sand.

STEP 3: Collect the filtrate containing the soluble component and evaporate the water.



- 37) What procedure is *safest* to follow when using an open flame to heat the contents of a test tube that contains a flammable mixture?

A) Heat the open test tube gently near the bottom only.

B) Cork the test tube and then heat it gently near the bottom only.

C) Place the open test tube in a beaker of water, then heat the water in the beaker.

D) Cork the test tube and place it in a beaker of water, then heat the water in the beaker.

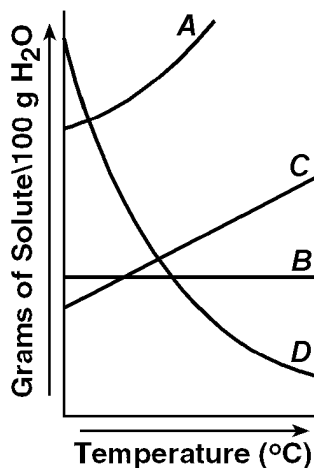
- 40) A student observing the behavior of paradichlorobenzene first heats 10 grams of the substance in a hot water bath until it is completely liquefied. The following data are recorded as paradichlorobenzene cools.

DATA TABLE:

Time (minutes)	Temperature (°C)
0	65
1	58
2	52
3	53
4	53
5	53
6	53
7	53
8	51
9	47
10	42

What is the freezing point of paradichlorobenzene?

- A) 58°C B) 53°C C) 65°C D) 42°C
- 41) The graph below represents four solubility curves.



Which curve *best* represents the solubility of a gas in water?

- A) *A* B) *B* C) *C* D) *D*
- 42) A chemist wants to confirm whether a sample of metal is pure gold or an alloy of gold and other less dense metals. She determines the volume of the sample to be 2.60 cm³ and the mass of the sample to be 37.89 grams.
- Determine the density of the sample. [*Write the correct formula.*] [*Show all work.*] [*Round answer to the correct decimal place and include an appropriate unit.*]
 - Assuming that the chemist measured the mass and volume of the sample accurately, what conclusion should she make about the composition of the sample?

- 43) In the laboratory, a student performed a titration to determine the concentration of a solution of NaOH using 2.0 M HCl.

The following data was collected:

	Trial 1	Trial 2	Trial 3	Average
Volume of Acid	10.50 mL	9.85 mL	9.70 mL	10.02 mL
Volume of Base	20.00 mL	20.00 mL	20.00 mL	20.00 mL

- (a) Write the balanced equation for the reaction between HCl and NaOH.
- (b) Based on the data above, calculate the molarity of the NaOH. [*Write the correct formula.*] [*Show all work.*] [*Indicate the correct answer with an appropriate unit.*]
- (c) State *one* advantage to using the average volume of three trials over the results from a single trial.