

MY SO PRACTICE TEST

DIVISION B - MIDDLE SCHOOL, GRADES 6-9

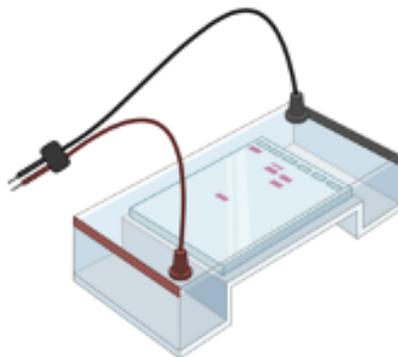
PRACTICE TEST

Instructions

- You have 20 minutes to complete this test.
- You may write your answers directly in the test.
- You may use any notes or resources you have created or collected.
- You may use a calculator and scratch paper if necessary.
- Good Luck!

Test Questions

1. For which of the following powders will a piece of litmus paper turn red?
 - a. Sodium bicarbonate
 - b. Vitamin C
 - c. Yeast
 - d. Sodium acetate
2. The lab technique pictured below is called _____, and DNA/RNA fragments analyzed using this process migrate based on _____.



- a. Electrophoresis; length
- b. Electrophoresis; charge
- c. Chromatography; size
- d. Chromatography; sequence

3. True/false: vegetable fibers burn faster than synthetic fibers.
- True
 - False

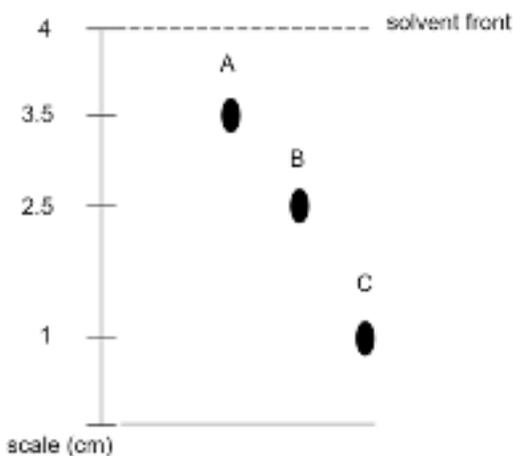
Use the following scenario to answer questions 4-6.

You find an odd assortment of medals backstage at the National Science Olympiad Tournament. Instead of gold, silver, and bronze, the medals appear to be something else! Luckily you have your water bottle and a magnet to help you identify the strange medals.

4. One medal is a dull, light color. It is not magnetic. When you pour water over the medal, tiny bubbles appear after a short amount of time. What metal is this medal likely composed of?
- Aluminum
 - Copper
 - Iron
 - Magnesium
5. One medal is much heavier than the others, even though they are all the same size. It is not magnetic, and it is very shiny. What metal is this medal likely composed of?
- Aluminum
 - Iron
 - Zinc
 - Tin
6. One medal of the bunch is magnetic. What metal is this medal likely composed of?
- Aluminum
 - Iron
 - Magnesium
 - Tin
7. Which type of fingerprint(s) have no deltas?
- Loop and whorl
 - Arch and loop
 - Only arch
 - Only whorl

Use the following scenario for questions 8-9.

Someone has stolen the answer key to a Science Olympiad Forensics test straight from the event supervisors' desk! There is a note from the criminal and three pens at the crime scene. You perform a paper chromatography test on the three pens. The result is shown below.



8. Which pen has an Rf value of approximately 1/4?
- A
 - B
 - C

You determine that the note from the criminal was written using pen C. You identify this fingerprint on the pen:



9. Which of the following is true?
- If this is a radial loop, the criminal is right-handed
 - If this is an ulnar loop, the criminal is right-handed
 - If this is a radial loop, the criminal is left-handed
 - If this is an ulnar loop, the criminal is left-handed
 - Both (a) and (d)
 - Both (b) and (c)

Use the following scenario to answer questions 10-13.

Your Forensics partner left multiple unlabeled test tubes filled with liquids behind in your middle school chemistry lab. You decide to identify them in order to properly dispose of them.

10. The first test tube you examine is a bit cloudy. You determine its pH to be 2. What liquid is in this test tube?
- Vinegar
 - Lemon juice
 - Isopropyl alcohol
 - Ammonia
11. You are able to smell the liquid in the next tube even before you begin to examine it. The pH test reveals it is a very basic substance. What liquid is in this test tube?
- Hydrogen peroxide
 - Vinegar
 - Ammonia
 - Isopropyl alcohol
12. On the third test tube you are able to see a faint label from your Forensics partner. It reads: CH_3COOH . What liquid is in this test tube?
- Isopropyl alcohol
 - Vinegar
 - Ammonia
 - Lemon juice

13. There are two test tubes left. Both are filled with clear liquids. There is no distinctive smell to either liquid. You think one liquid is water, while the other is hydrogen peroxide. You pour a bit of each of the liquids into different wells on a testing tray. You then add a few drops of iodine to both wells. What do you expect to happen in each of the wells, if your hypothesis is correct?
- Both wells will have no reaction
 - One well will have no reaction; the other well will have an immediate bubbling reaction
 - One well will have no reaction; the other well will have a delayed bubbling reaction
 - Both wells will have an immediate bubbling reaction

Use the following scenario to answer questions 14-15.

Someone was causing mischief in the cafeteria and spilled their tomato soup everywhere!! As a pro forensic scientist, you help the cafeteria staff analyze the soup stains.

14. The first soup stain is pictured below. Based on the spill pictured, what was the direction of motion?
- Towards the upper right
 - Towards the bottom left
 - Could be either the upper right or bottom left
 - None, they were created when dropped from directly above



15. The second soup spatter has drops that are mostly circular and about 6 millimeters in diameter. How would you identify the velocity and type of this spatter?
- Low velocity passive stain
 - Low velocity projected stain
 - Medium velocity passive stain
 - Medium velocity projected stain
 - High velocity passive stain
 - High velocity projected stain
16. Your dog has brought you a present! It's a single tennis shoe. You suspect that your dog has just robbed one of your neighbors, and you need to figure out who the shoe belongs to. After analyzing the dark brown soil on the shoe, you determine that it is a mixture of three differently sized particles and contains much organic matter. Based on this information, which of your neighbors might be the victim of this robbery?
- Rachel, who has recently been to a sandy beach
 - Matt, who has recently gotten into making clay pottery
 - Meredith, who has a very successful garden using loamy soil
 - Helen, who has a very unsuccessful garden using chalky soil
17. You find a mysterious hair on your kitchen counter. As a forensics expert, you analyze the hair under a microscope. You determine that its medullary index is approximately 0.2, and there are flattened, narrow cuticle scales. Who might this hair belong to?
- Your cat
 - Your dog
 - Your hamster
 - A person

18. Which of the following correctly describes the complementary nucleobase pairing in DNA?
- Adenine pairs with guanine; cytosine pairs with thymine
 - Adenine pairs with cytosine; guanine pairs with thymine
 - Adenine pairs with thymine; guanine pairs with cytosine
 - None of the above

Use the following scenario for questions 19-21.

You find two powders. Both are white in color. Powder 1 has a pH of about 2 when dissolved in water and has a distinctive meat-like smell. Powder 2 does not dissolve in water, and when iodine is added to it clumps and turns black.

19. What could possibly be the identity of powder 1?
- Hydrochloric acid
 - Ascorbic acid
 - Acetic Acid
 - Yeast
20. What could possibly be the identity of powder 2?
- Salt
 - Sugar
 - Flour
 - Cornstarch
21. What could these two powders have originally made up?
- Fruitcake
 - Vitamin Tablet
 - Baby Powder
 - Beauty Product
22. You have the following powders: Alka-Seltzer, gypsum, sodium acetate, and calcium carbonate. However, you don't know which is which, and you don't have a hand lens. Which of the following analyses would allow you to conclusively identify at least one of them with no further testing?
- Dissolution in water
 - pH testing
 - Visual identification
 - Hydrochloric acid testing
23. Which of the following statements is TRUE?
- Unlike human hair, cat hair has a scaly cuticle.
 - Unlike human hair, cat hair has a nearly invisible medulla under a microscope.
 - Like human hair, cat hair has a scaly cuticle.
 - Like human hair, cat hair has a nearly invisible medulla under a microscope.
24. Which of the following types of plastics will float in vegetable oil?
- Low Density Polyethylene
 - High Density Polyethylene
 - Polypropylene
 - Polystyrene

You have been given a sample of plastic to analyze at the lab. You perform the following tests with these results:

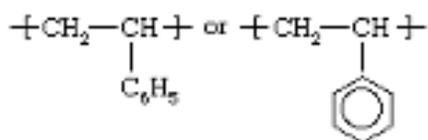
| Test | Results |
|--------------|-------------------------------------|
| Density Test | Sample floats in water |
| Flame Test | Sample creates a green-tipped flame |

25. What type of plastic do you hypothesize this sample to be?

- a. PS
- b. PP
- c. PVC
- d. PC

26. The image below represents the general chemical structure of what common type of plastic?

- a. PS
- b. PP
- c. PVC
- d. PC



27. Meredith's favorite shirt is her favorite because she loves the way the fabric feels. She wants to buy more shirts with this type of fabric. Sadly, the tag has fallen off her favorite shirt, so she needs another way to identify the fabric used. She decides to cut off a bit of the shirt and perform a burn test on it. Surprisingly, the results she finds don't match up with any of her notes for common fabrics! What is a possible explanation for these findings?

- a. Her favorite shirt may contain a blend of fibers, making the test results unreliable or uncomparable to typical fabric burn tests.
- b. Her favorite shirt may have chemical finishings or coatings, making the test results unreliable or uncomparable to typical fabric burn tests.
- c. Her favorite shirt may be made of animal fibers, making the test results unreliable or uncomparable to typical fabric burn tests.
- d. All of the above
- e. A and B only
- f. B and C only

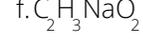
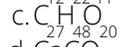
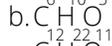
28. Your Forensics lab partner hands you a test tube where they have just mixed sodium acetate and water. What observation regarding the tube's temperature do you make?

- a. The test tube feels warm.
- b. The test tube feels cold.
- c. The test tube does not have a distinctive warm or cold feeling.

29. What is the **sum** of the molecular mass of sodium bicarbonate and the molecular mass of Alka-Seltzer?

- a. 84 g/mol
- b. 42 g/mol
- c. 456 g/mol
- d. 540 g/mol
- e. 498 g/mol
- f. 126 g/mol

30. You are given a mixture of powders. Upon dropping a few drops of HCl into a small amount of the mixture, no fizzing occurs. Which of the following compounds could therefore not be present in the mixture?



ANSWER KEY

- | | | | | | |
|-----|----------|-----|----------|-----|----------|
| 1. | B | 15. | A | 29. | D |
| 2. | A | 16. | C | 30. | D |
| 3. | B | 17. | D | | |
| 4. | D | 18. | C | | |
| 5. | C | 19. | B | | |
| 6. | B | 20. | C | | |
| 7. | C | 21. | A | | |
| 8. | A | 22. | A | | |
| 9. | E | 23. | C | | |
| 10. | B | 24. | C | | |
| 11. | C | 25. | C | | |
| 12. | B | 26. | A | | |
| 13. | C | 27. | E | | |
| 14. | B | 28. | A | | |



Practice Test Developed with Science Olympiad at Cornell



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