

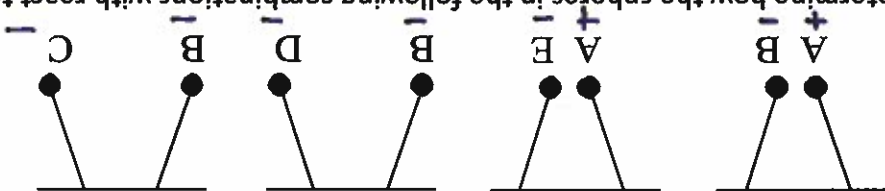
Static Electricity

NAME: Answers -

Triboelectric series (in your notes)

You need: $1C = 6.25 \times 10^{18}$ electrons

1. The spheres in the diagram have been charged. (3)



Determine how the spheres in the following combinations will react to one another.

Attract

Repel

Attract

Repel

Attract

Repel

a. Sphere B with sphere A?

b. Sphere C with sphere D?

c. Sphere D with sphere E?

(circle the answer = repel or attract)

2. You rub a glass rod with paper towel. You then rub a piece of acetate with silk. Finally, you rub a piece of polyethylene with wool. Using your knowledge of the triboelectric series, what would happen if... (you do NOT need to explain).

Do they repel or attract each other? Please circle (2)

a) You bring the charged silk towards the charged paper towel

attract

repel

b) You bring the charged acetate towards the charged polyethylene

attract

repel

3. Are the following objects charged by friction, conduction or induction? (2)

a) Sam brings a charged comb close to his hair without touching it, and his hair stands on end.

b) Electrons are transferred from one body to another, resulting in two bodies carrying the same charge.

c) When we walk about, our bodies may accumulate an electrical charge.

d) How does a dryer build up charge?

- induction 0.5
- conduction 0.5
- friction 0.5
- friction 0.5

Please show your work for all mathematical problems below!

4. During a storm, impressive bolts of lightning form jagged lines across the sky. The lightning is caused by a brief but powerful electrical discharge. If the electrical discharge of a lightning bolt is equal to 20 C, how many electrons were involved? (2)

$$1C = 6.25 \times 10^{18} e^-$$

$$20C$$

$$\times$$

$$1.25 \times 10^{20} \text{ electrons}$$

5. After charging a piece of fabric, Justin calculates that it has gained 3×10^{20} electrons. (2)

$$1C = 6.25 \times 10^{18} e^-$$

$$3 \times 10^{20} e^-$$

$$48C$$

b) Is this charge positive or negative? Explain your answer.

"gained electrons" → negative

11

1

1

2

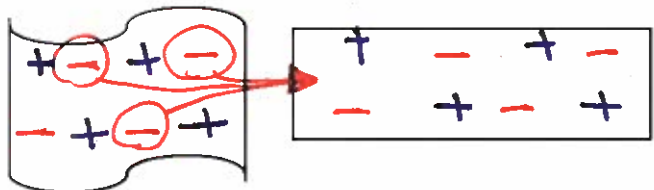
2

3

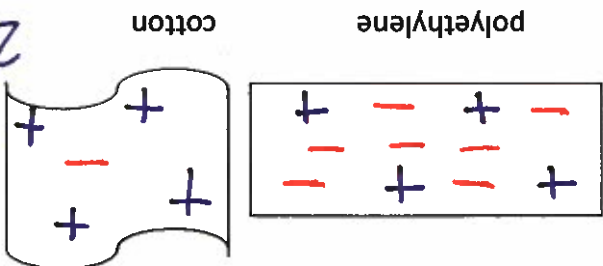
Static Electricity

6. Consider a polyethylene ruler and a piece of cotton that become charged after being rubbed together. (6)

a) Draw four "+"s and four "-"s on each item to show their distribution before the items are rubbed together:



b) Draw the same four "+"s and "-"s on the items are rubbed together:



c) Explain the movement of the charges. (Explain: 1. What is moving? 2. What resource do you use to determine which item will receive the negative charges? 3. What is the resulting charge of each item?)

1. electrons
2. triboelectric series
3. The final charge of the polyethylene ruler is negative & the final charge of the cotton is positive.

7. Use the following triboelectric table to answer this question. (3)

Silicone
Polypropylene
Ebonite
Cotton
Silk
Wool
Glass
Fur

You are given an unknown material and asked to locate its position on the triboelectric table. You first rub the polypropylene strip with wool. You are then given a second polypropylene strip that was rubbed with an unknown material.

When you bring the two charged polypropylene strips together, they attract each other!

Which of the four positions shown in the table below, match the location of the unknown material. Explain your reasoning.

Silicone
*Position 1
Polypropylene
*Position 2
Ebonite
Cotton
Silk
*Position 3
Wool
*Position 4
Glass
Fur

Explain your choice:

The polypropylene strips have opposite charges because they attract each other.

The strip paired with the unknown is positive

Position #1 is the only pairing that would allow the strip to become positive.