

## Captains Tryouts 2018-19 Forensics Answer Key

Lower Merion High School

### Powders

- A - glucose ( $C_6H_{12}O_6$ )
- B - sodium bicarbonate ( $NaHCO_3$ )
- C - magnesium sulfate ( $MgSO_4$ )
- D - calcium carbonate ( $CaCO_3$ )
- E - lithium chloride ( $LiCl$ )
- F - boric acid ( $H_3BO_3$ )
- G - sodium acetate ( $C_2H_3NaO_2$ )

1.  $2CuSO_4 \cdot 5H_2O + C_6H_{12}O_6 \rightarrow C_6H_{12}O_7 + Cu_2O + 2H_2SO_4 + 8H_2O$
2. Yes,  $AgCl$
3. Purple, potassium (K)
4. Sodium chloride ( $NaCl$ )
5. Sodium
6. Varies, may include dry cell battery, chemicals to process fabrics, cough medicine, fertilizers, metalwork, cleaning, cattle food, instant heat pack, etc.

### Plastics

- A - Polypropylene (PP)
- B - High density polyethylene (HDPE)
- C - PP

1. HDPE
2. Polystyrene (PS)
3. Polyvinyl chloride (PVC)
4. Condensation reaction
5. Styrene ( $C_8H_8$ )

### Fibers

- A - cotton
- B - silk
- C - wool
- D - spandex

1. Cotton
2. Animal: wool, silk. Vegetable: cotton, linen. Synthetic: nylon, spandex, polyester.
3. Polyester
4. Animal
5. Silk

## Hairs

- A - dog
- B - bat
- C - horse
- D - cow

1. May vary. A: lighter medulla B: barbed/blocked pattern C: thick, dark medulla D: thick, dark medulla and cuticle
2. Round follicle vs oval-elliptical follicle

## Chromatography

$R_f$  calculated by distance solute traveled/distance solvent traveled in cm, chromatography performed properly (line drawn for start and end of solute movement, ink dot on line well sized, solvent level in beaker below solute start line, relatively straight movement of ink on paper)

1. The ink that traveled further is more polar.
2. High Pressure Liquid Chromatography

## DNA

B and D

1. Kilopairs
2. Negative
3. Hydrogen bonding

## Fingerprints

1. From top to bottom: crossover, core, bifurcation, ridge ending, island, delta, pore.
2. From left to right: central pocket whorl, radial loop, ulnar loop, plain arch, ulnar loop.

## Blood

From left to right: O-, AB+, AB-, A-

## Analysis

NB: the slashes are to mean "character descriptive trait/evidence found at crime scene"

JAKE

- +10 hold
- +1 motive
- +2 bipolar/LiCl
- +2 sugary coffee/glucose
- +2 cotton Gucci/cotton
- +2 dog/dog

PEPE

+10 hold

+1 motive

+2 heating packs/ $C_2H_3NaO_2$

+2 eye drops/ $NaHCO_3$

+1 blood

RAINI

+10 hold

+1 motive

+2 jewelry cleaner/ $H_3BO_3$

+2 silk robes/silk

+1 fingerprint

TOM

+10 hold

+2 heartburn pills/ $CaCO_3$

+2 laxatives/ $MgSO_4$

+2 yogurt/PP

+2 bat/bat

+1 chromatography