**Proteins Lab: Making casein-based massage cream**

Date, team members, and team name:

**Massage Rolling Cream: 1909 Recipe**

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| **Ingredients from 1909** | **Purpose** | **Modern substitute** | **Amount in 1909 recipe** | **Convert to grams** |
| Stearic acid | The main fatty acid. An emollient. |  | 4 oz |  |
| Glycerin | Skin moisturizer. |  | 4 oz |  |
| Water | Thinning agent. |  | 16 oz. But don’t need nearly that much. |  |
| Potassium carbonate | Foaming agent. |  | 1 dram |  |
| Boric acid | Antimicrobial. Was thought to cure acne and heal cuts. | Sm. amt. sorbic acid preservative. Follow directions on pkg. | ½ oz |  |
| Casein | Emulsifier. |  | 1 oz |  |
| Powdered tragacanth | Thickener. | Xanthan, but very sparingly if at all! | 15 g |  |
| China clay | Absorb impurities. | Kaolin clay. Try smaller amt. Don’t need much | 3 oz |  |
| Carmine solution | Pink dye. | Beet root powder. | Q.S. |  |
| Perfume |  |  | Q.S. |  |

Conversions: 1 oz = 28 g. 1 dram = 1/8 oz. Q.S. means “quantum sufficit”.

**Making the Casein:**

3 c of milk. 5 tbsp vinegar. Heat gently. Let curds form. Handle curds gently! Don’t overmix or dry-out, or it will turn to rubber. Remove and rinse the curds using a sieve or cheesecloth. Then you can stir the casein solids with mortar & pestle to make a creamy texture. When stirring, add a pinch of KOH to help it break down faster.

**Notes:**

Soften the stearic acid over a double boiler arrangement. Then gradually add the other ingredients. A little paraffin is also fun to experiment with. Go easy with the water; you don’t need that much. Go easy with the clay, too. Slowly add a little clay at a time. You don’t ‘need’ the potassium carbonate, but fun to try with side batch. Xanthan is extremely powerful thickener; go very easy! Sorbic acid is a well-known cosmetics and food preservative; follow directions on package.

**Biology Questions:**

Complete these questions and turn them in, or upload to Canvas later. This constitutes your “lab report” for this lab.

1. Do internet research and describe the protein “casein”. How many amino acids does it have? What is its molecular weight?
2. Why does vinegar cause casein to appear? What is happening to the protein molecule?
3. What is meant by an emulsifier? Why would you want this in a skin cream? How do you know casein is a good emulsifier?
4. Draw a molecule of stearic acid. It has 18 carbons, including the one on the carboxylic acid ‘end’. Is it a saturated fat, or unsaturated? Why?
5. What is meant by “emollient”?
6. Draw a glycerin molecule. Chemically speaking, why does it dissolve in both fats AND water?

1. Write the formula for potassium carbonate. What is its molecular weight?