

# Compatibility of Nafcillin Sodium and Gentamicin Sulfate

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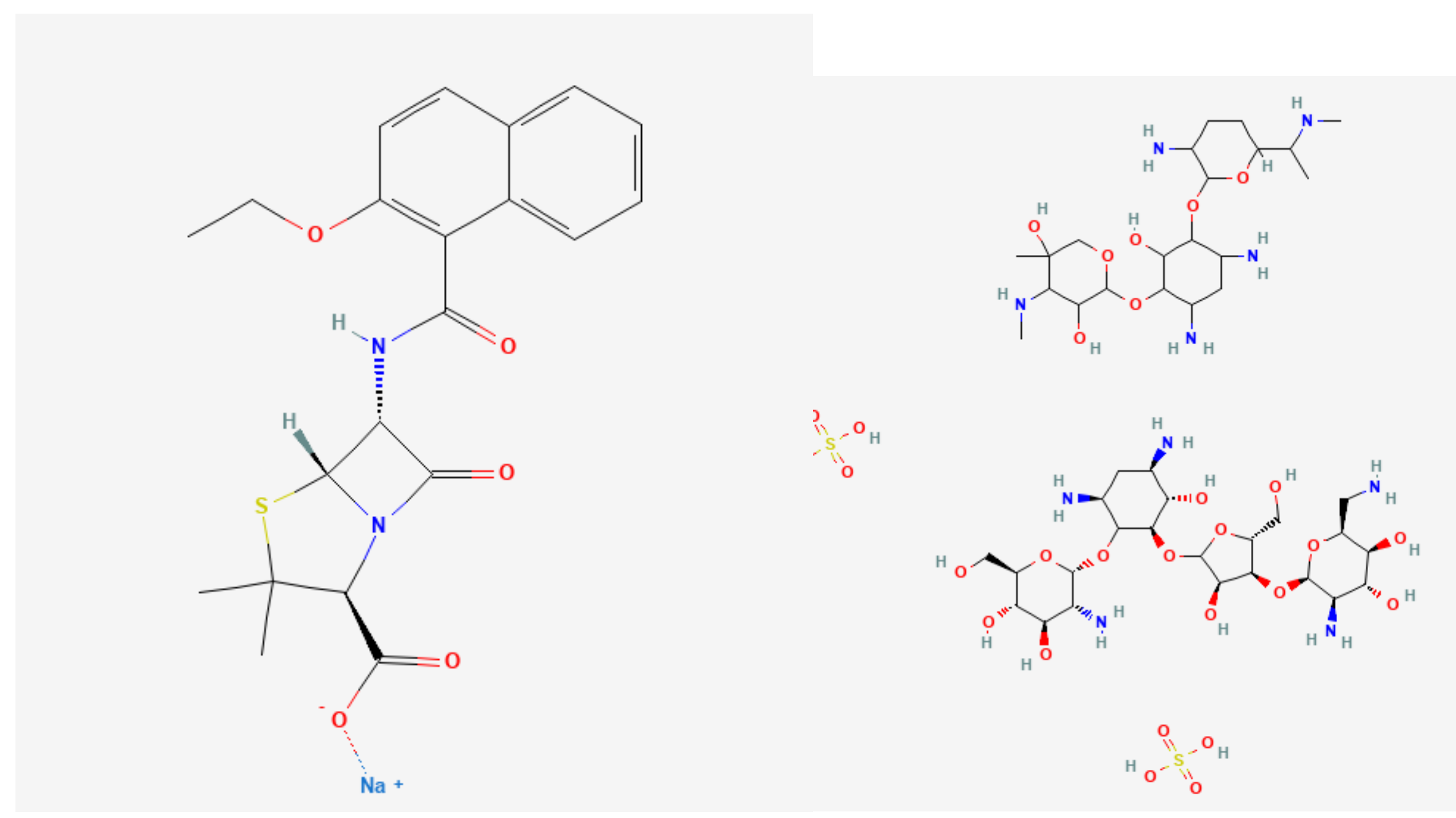
## Background

- Aminoglycosides and  $\beta$ -Lactams are used concurrently for synergistic effects in cases of severe infections.
- There are known interactions with  $\beta$ -Lactams and aminoglycosides.
- There are limited studies with these interactions, specifically with nafcillin and gentamicin.

## Structures

nafcillin sodium

gentamicin sulfate



	Nafcillin Sodium	Gentamicin Sulfate
Molecular Weight	454.47 (monohydrate)	463.57* (Avg.)
pKa (strongest acidic)	3.1	12.55
Solubility	1.72E-02 g/L	1.26E+01 g/L
Chemical formula	C <sub>21</sub> H <sub>21</sub> N <sub>2</sub> NaO <sub>5</sub> S	C <sub>60</sub> H <sub>125</sub> N <sub>15</sub> O <sub>25</sub> S
pH	6.0-8.5	3.0-5.5

## Heading

- Nafcillin (reconstituted with 3.4ml of sterile water[SW]) mixed with Gentamicin. **Figure 1**
- Nafcillin (recon. with 3.4ml of 5% dextrose[D5W]) mixed with Gentamicin. **Figure 2**
- Nafcillin (recon. with 3.4ml of 0.9% sodium chloride[NS]) mixed with Gentamicin. **Figure 3**
- Nafcillin (recon. with 3.4ml of SW/D5W/NS) mixed with Gentamicin in 20mL of SW. **Figure 4**
- 500mg of nafcillin mixed with 25mg of gentamicin in triplicate in 7.375mL of each SW/D5W/NS ; in 20 mL syringes. **Figure 5**

## Results

Fig. 1 – yellow precipitate formed

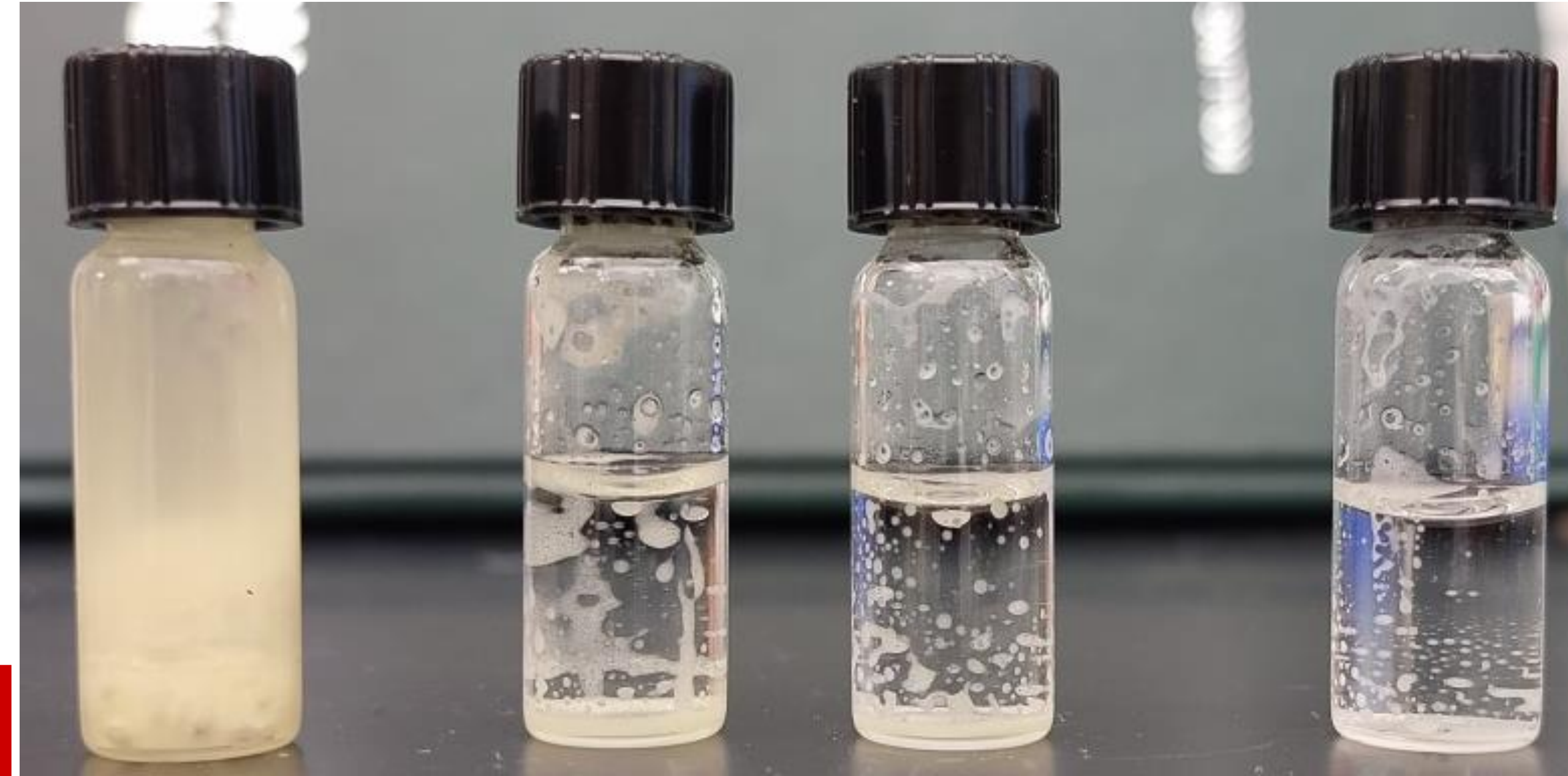


Fig.2 - yellow precipitate formed

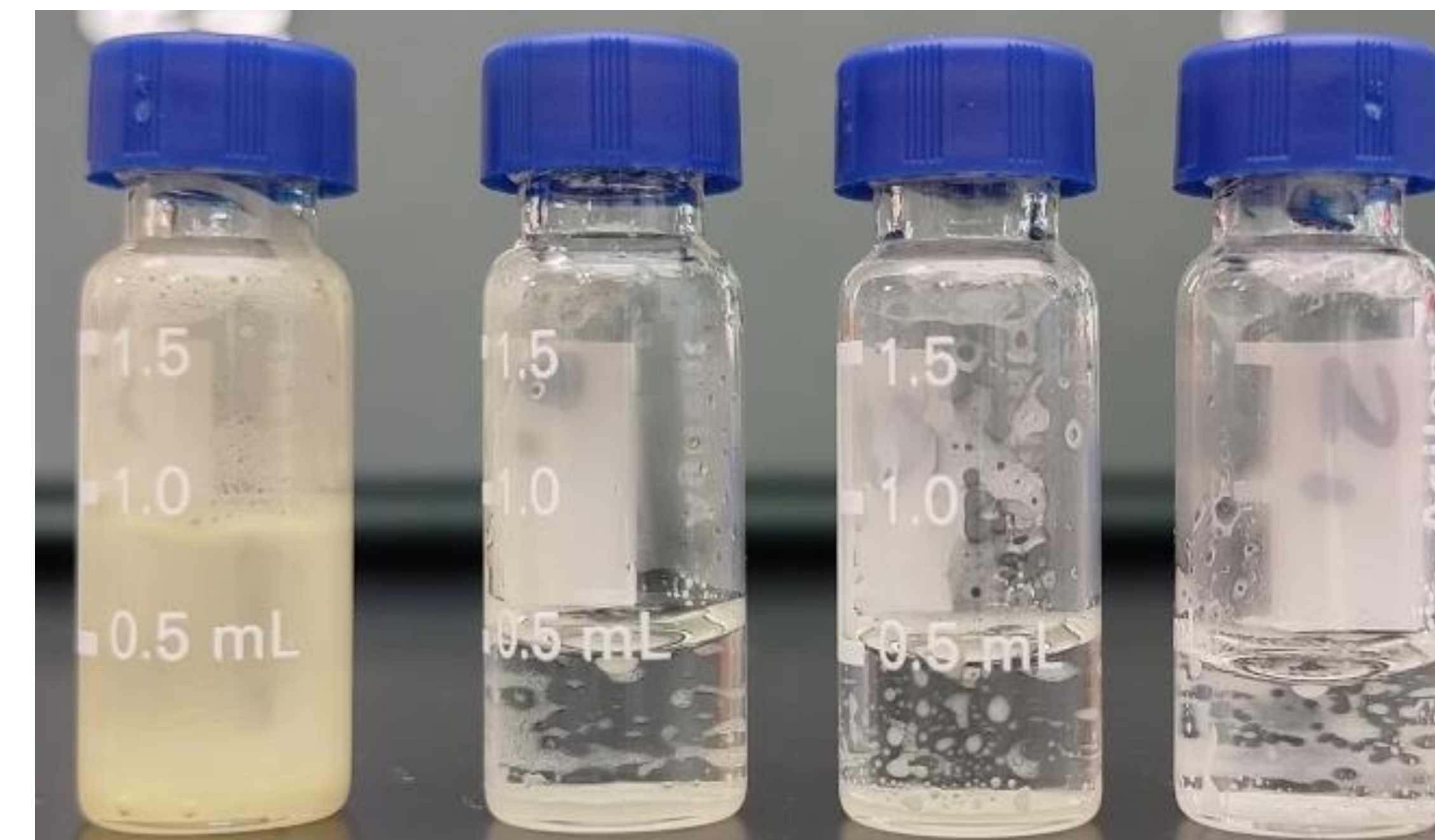


Fig.3 - yellow precipitate formed

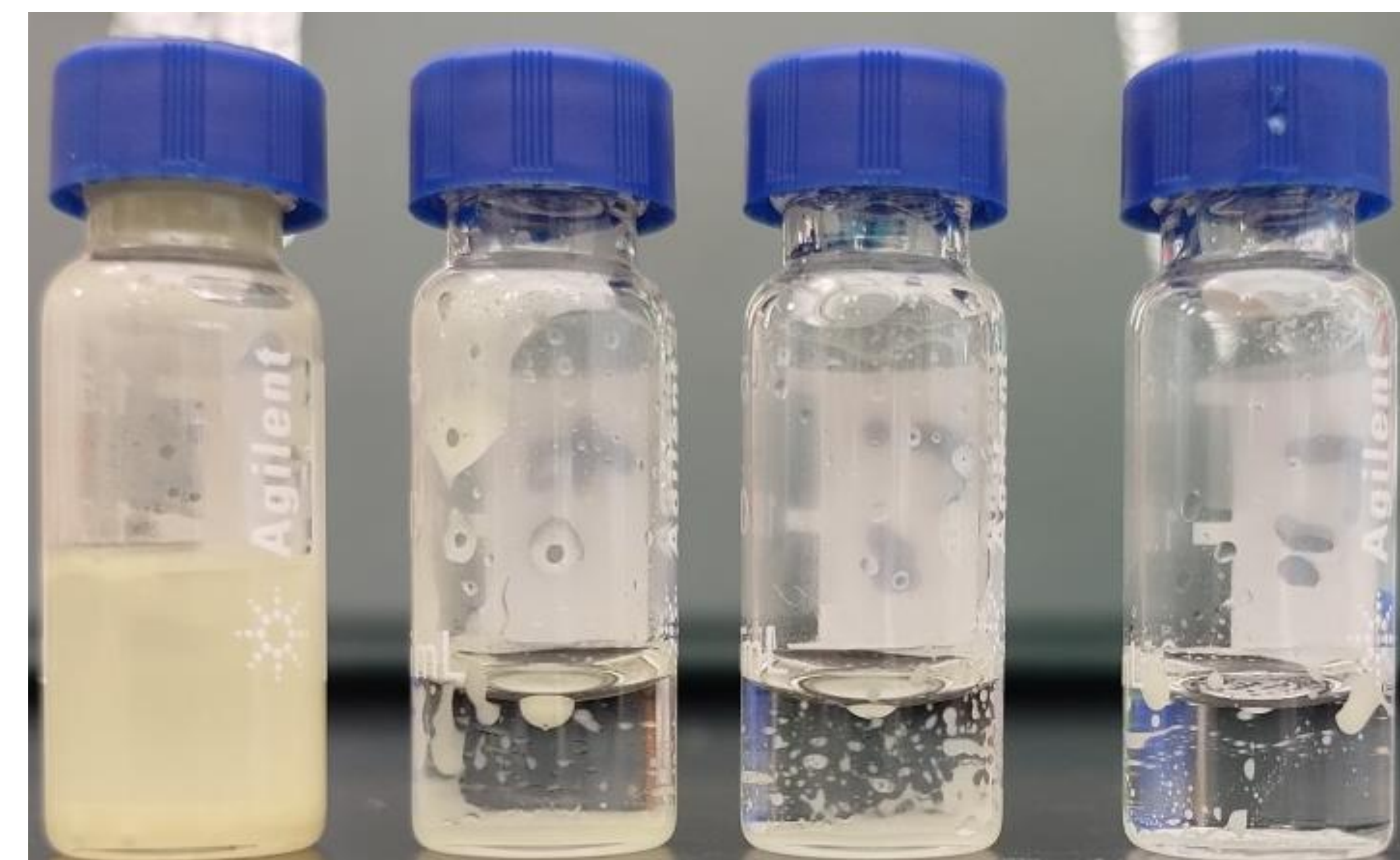
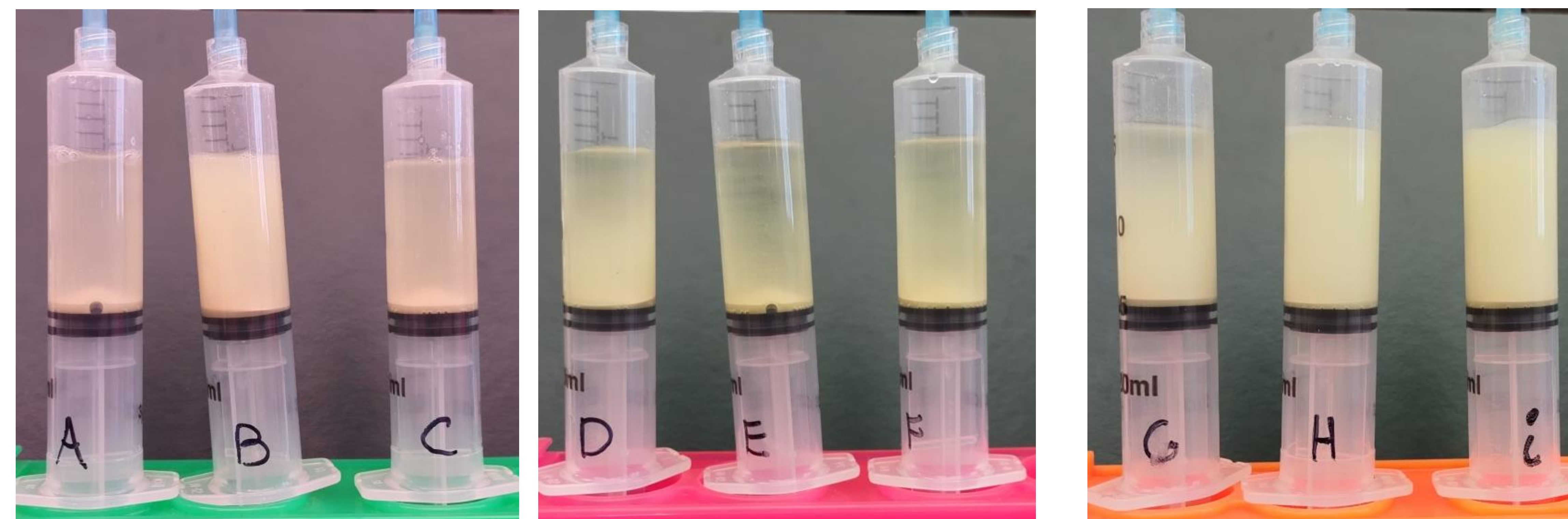


Fig.4 – precipitate formed at low concentrations



Fig.5 – all syringes formed precipitate



## Conclusion

- Testing various concentrations and various solutions has proven that precipitate will form when mixing nafcillin sodium and gentamicin sulfate confirming that gentamicin and nafcillin are incompatible in syringe and glass vial.
- More testing will need to be done in order to determine if this interaction causes inactivation of gentamicin or causes a new compound to form, or if pure gentamicin/nafcillin is precipitating out in the solution.
- Further research/investigation:
  - nuclear magnetic resonance spectroscopy (NMR)
  - differential scanning calorimetry (DSC)
  - isothermal calorimetry
- This does not rule out the use of the two medications as long as they are administered in separate sites.

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