**INTENSIFYING SCREEN EMISSION**

**Group Laboratory Experiment #9**

**Procedure:**

Read all of the questions below before proceeding. Open the cassettes listed and place them on the tabletop (remove any films from the cassettes in the dark room first, and put them back in the film bin). Darken the room, and open the collimated field all the way to a 17 x 17 inch area. Arrange the open cassettes in a square with their corners meeting at the cross-hairs of the light field, so that *one of the screens* from each cassette lies within the light field. Stand behind lead barriers or wear aprons, and observe the color and brightness of light emission during exposure.

Exposure #1 = 10 mA at 60kvp, 3 to 4 seconds

Exposure #2 = 50 mA at 60 kVp, 3 to 4 seconds, same as #1

Exposure #3 = 50 mA at 60 kVp, 1.5 to 2 seconds, half of #2

Exposure #4 = 50 mA at 110 kVp, 3 to 4 seconds

*Alternate Techniques:*

Exposure #1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exposure #2 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exposure #3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Analysis:**

**NOTE:** The **brightness** you observe is actually the *rate* of light coming from the screen (not the total sum of light that will strike the film and determine film density).

1. Comparing Exposures #1 and #2, what happens to the brightness of the screens when the **mA** is increased? Briefly **explain why:**

2. Comparing Exposure #2 and #3, what happens to the brightness of the screens when the **time** is decreased? Briefly **explain why:**

3. Comparing Exposures #3 and #4, what happens to the brightness of the screens when the **kVp** is increased? Briefly **explain why, in relation to the function of the screen:**

Bonus: For Question #3, explain another reason why we got this result, in relation to the X-RAY TUBE function:

4. Describe the differences in the color that each screen emits:

1. Slow (detail) Speed Calcium Tungstate: \_\_\_\_\_\_\_\_\_\_\_
2. Par Speed Calcium Tungstate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Rare Earth Extremity Cassette: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Rare Earth “Regular” Cassette: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Which screen glows the brightest?

6. Why must a different type of film be used when changing from Calcium Tungstate screens to Rare Earth screens?

With the lights on, compare the color of the actual emulsion between the Slow Calcium Tungstate screen and the Par Calcium Tungstate screen. Open a *High-* or *High-plus* speed Calcium Tungstate screen and compare its emulsion to the Par Calcium Tungstate screen.

7. Explain why the Par Calcium Tungstate glows bgrighter than the Slow Calcium Tungstate. Also, what type of screen efficiency (absorption, conversion, or emission) does this relate to?

8. Explain why the High Calcium Tungstate would glow brighter than the Par Calcium Tungstate. Also, what type of screen efficiency (absorption, conversion, or emission) does this relate to?

9. Explain TWO reasons why the Rare Earth screen glows brighter than the Calcium Tungstate, each of which addresses a different type of screen efficiency (absorption, conversion, or emission) as discussed in class. Name the type of efficiency related:

1. Efficiency Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Explanation:

2. Efficiency Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Explanation: