

Name: _____ Student ID: _____
CHEM 161 PAL Fall 2026

Worksheet #28: Photosynthesis Light Reactions

1. Draw a labeled diagram of the light-dependent reactions of photosynthesis, showing noncyclic electron flow through the thylakoid membrane. Include and clearly label the following components: stroma, thylakoid membrane, thylakoid lumen, Photosystem II (PSII), Photosystem I (PSI), P700, P680, cytochrome b_6f complex, plastoquinone (PQ), plastoquinol (PQH_2), plastocyanin (PC), ferredoxin (Fd), ferredoxin– $NADP^+$ oxidoreductase, $NADP^+$, NADPH, H_2O , O_2 , and H^+ (protons).

Use arrows to:

- Show the direction of electron flow.
- Indicate where light energy is absorbed.
- Show where H^+ ions are generated or transported across the thylakoid membrane, including the direction of proton movement.

Name: _____ Student ID: _____

CHEM 161 PAL Fall 2026

2. How can plant cells generate ATP without producing NADPH during the light-dependent reactions? Describe the electron-flow pathway that makes this possible.
3. List and briefly describe three similarities between the light dependent reactions of photosynthesis and oxidative phosphorylation.
4. Excessive sunlight can damage chlorophyll. What effect would this have on photosynthesis? Explain.
5. Excessive light exposure can increase the production of reactive oxygen species (ROS). Explain how secondary pigments reduce photooxidative damage. Provide examples of these pigments and draw the complete chemical structures of at least two.