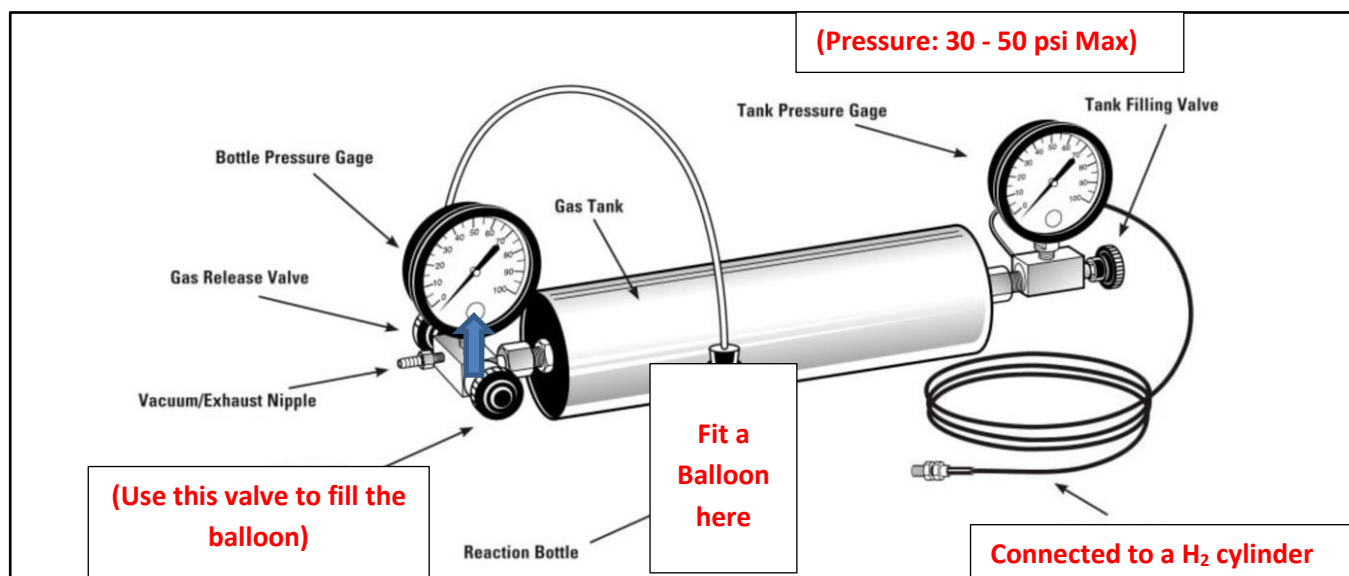




## SOP: Filling a BALLOON with H<sub>2</sub> gas from Parr Hydrogenator - LAB 7B



### 1. Filling up a balloon with H<sub>2</sub> gas

- Make sure you have doubled-up your balloon and everything is properly sealed with parafilm (**balloon fitted to a 1 mL syringe is recommended**).
- Familiarize yourself with the set-up image above.
- Open the hydrogen **cylinder valve** (turn anti-clockwise) to fill up the **gas tank (30 - 50 psi on tank pressure gauge is recommended)**, then close the cylinder (turn clockwise).
- Fit the balloon using 1 mL syringe onto **reaction bottle** outlet/tube
- Slowly open the **bottle valve** (anti-clockwise) to fill a balloon and turn clockwise to close.
- Secure the balloon and **repeat step (e)** to release residual H<sub>2</sub> gas in the lines.
- Ensure tank pressure gauge reading is zero** & both **bottle** and **cylinder** valves are closed.
- Exit the filling station.



Cylinder valve (see step C above)



## HEALTH & SAFETY ISSUES

Reactions with a hydrogen balloon are not unduly hazardous if the user operates with the realization that hydrogen is highly flammable and that precautions must be taken while setting up and stopping the reaction.

1. Use additional protection such as an extra barricade:
  - a. For a reaction that may run out of control
  - b. An unexpected flask breakage can produce a hazardous spill of toxic or flammable materials
2. **Fire & explosion hazard:**

Hydrogenation reactions pose a significant fire hazard due to the use of flammable solvents. The presence of hydrogen gas increases the risk of explosion. Therefore:

  - a. No gas burners or open flames near apparatus.
  - b. Area must be well ventilated.
  - c. Care must also be taken to prevent ignition by a static charge from an uninsulated object.
  - d. Ensure the reaction flask is properly sealed before starting - to prevent any leak.
  - e. Flask can break – take precautions to protect yourself & others from the explosion and the possible fire from catalyst & hydrogen exposure to oxygen.
3. **Spillage & Fire:**
  - a. In case of small fires: use fire blanket, CO<sub>2</sub> or DCP/powder fire extinguisher. **DO NOT** use water if the reaction was run in a non-alcoholic solvent.
  - b. In case of an explosion, close the sash of the fume hood. An explosion during a hydrogenation usually expels the contents of the flask, which can lead to a fire. Be prepared to extinguish a fire.
  - c. If the contents do not immediately ignite, use a large volume of water or sand to quench the catalyst.
  - d. All catalysts must be handled cautiously – they are highly reactive, and cause a fire when brought into contact with organic liquids or combustible vapours in the presence of oxygen because of their ability to promote rapid oxidation.
  - e. Any catalyst that has been exposed to hydrogen is also potentially hazardous and may ignite spontaneously as it dries – keep used catalysts always wetted and out of contact from combustible vapours or solids. **DO NOT** add dry catalyst to a container containing a flammable solution or vapour.
  - f. Add the catalyst first and cover it immediately with the sample in solution OR pipette solvent to catalyst.
  - g. Precautions must also be taken to wash the catalyst from the thermocouple, the inlet tube and the stopper when opening the flask.
4. When working in a fume hood always keep sash lowered whilst reaction is busy.
5. Personal Protection: Gloves, laboratory coat, and safety glasses (or goggles)
6. Catalyst waste to be stored and discarded separately. Keep the catalyst wet at the end of the reaction.