

Chemistry 12 - Hebden Unit II

"Let's Play Equilibrium"

NAME _____

DATE _____ BLOCK _____

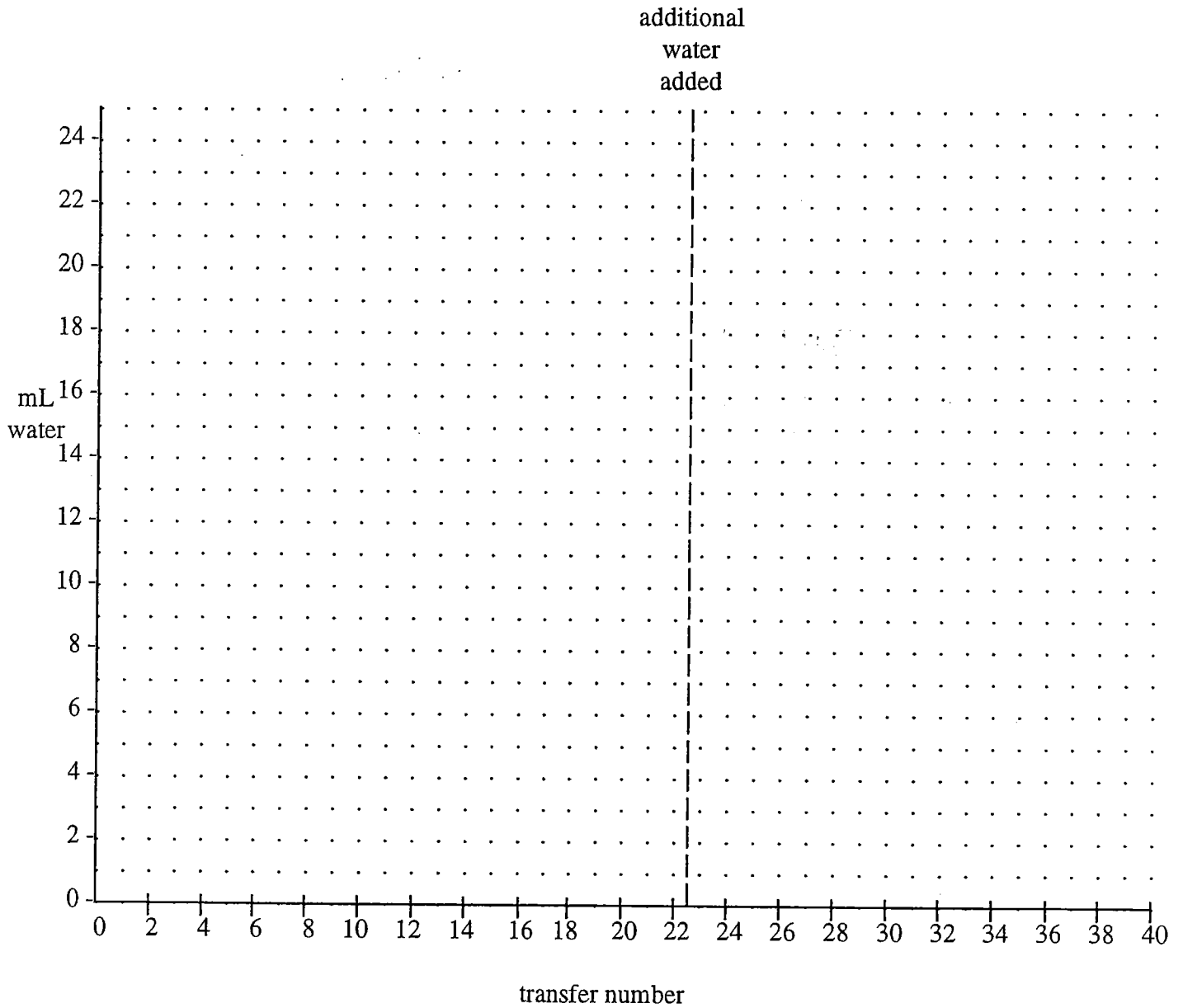
Directions:

- Find two identical 25 mL graduated cylinders - it doesn't matter what style the cylinders are, but they must be the same.
- Fill one of the cylinders to the 25 mL mark with tap water. Place the two cylinders side-by-side with the full cylinder on the right.
- Get two short lengths of glass tubing, making sure that one has a larger inner diameter than the other.
- Place the larger tube into the right-hand cylinder and the smaller tube into the empty left-hand cylinder.
- Place your thumb over the tops of each tube and, CAREFULLY transfer the water contents of each tube to the OTHER cylinder - Be careful not to drop (drip!) any water onto the table or miss the other cylinder.
- Record the volume in each cylinder and then return each tube back to its original cylinder - that is - the larger diameter tube to the right-hand cylinder and the smaller tube back to the left-hand cylinder.
- Repeat the transfer and volume recording steps MANY times. Complete the following table.
- After the 22nd transfer, add enough water to the right-hand cylinder to bring the volume up to 20 mL. Continue with the transfers.

Transfer #	Volume in right cylinder	Volume in left cylinder	Transfer #	Volume in right cylinder	Volume in left cylinder
0	25.0 mL	0 mL	20	_____	_____
1	_____	_____	21	_____	_____
2	_____	_____	22	_____	_____
3	_____	_____		20 mL	_____
4	_____	_____	23	_____	_____
5	_____	_____	24	_____	_____
6	_____	_____	25	_____	_____
7	_____	_____	26	_____	_____
8	_____	_____	27	_____	_____
9	_____	_____	28	_____	_____
10	_____	_____	29	_____	_____
11	_____	_____	30	_____	_____
12	_____	_____	31	_____	_____
13	_____	_____	32	_____	_____
14	_____	_____	33	_____	_____
15	_____	_____	34	_____	_____
16	_____	_____	35	_____	_____
17	_____	_____	36	_____	_____
18	_____	_____	37	_____	_____
19	_____	_____	38	_____	_____

Plotting your data

Plot your volumes as bold "dots" on the following graph. You will be constructing two separate graphs - one graph shows transfer number vs. right-hand cylinder volume and the other shows transfer number vs. left-hand cylinder volume. When connecting the dots of your two graphs, try to draw a smooth curved line through the majority of dots on each graph. Do not try to include dots which are obviously experimental error. Use two different colours to represent your graphs.



Questions

1. Define the term *reversible reaction*.

2. How is the concept of a reversible reaction accomplished in this simulation lab?

3. Define the term *equilibrium* in terms of forward and reverse reaction rates.

4. Define the term *equilibrium* in terms of observable (macroscopic) properties. (3 points please)

(A) _____

(B) _____

(C) _____

5. At what transfer number do you attain the first equilibrium in this simulation lab? How do you know?

6. Do the **amounts** of reactants and products have to be equal for equilibrium to occur? Why or why not?

7. At transfer number 22, we artificially added extra water (reactant) to the right tube. This constituted a stress to the equilibrium. What eventually happened to the simulation after the stress was imposed?

8. State *Le Chatelier's Principle*.
