

Blue is TBD/something made up

## Chemistry specific

### Questions

Define space of the game

Meeting Notes:

- Joe: Would be cool if used light and refraction to manipulate environments
- Joe: Briefing at the base to explain what they are doing and why
- Joe: Reflective surface of the ship as a cooling mechanism
- Jason: Legend, game tells you what you picked up as you pick it up

#### 1. General

- a. Some catastrophic event has occurred. The player has a base and must travel to some place. In order to progress the player must complete a series of finite levels. The levels are timed and the player must race to complete them. At the conclusion of each level, the player receives upgrades and advances to the next level. The player must defeat the final level, thus achieving the story related goal, to win the game.
  - i. Upgrade the cluster buster to destroy something?
- b. The player travels through a series of zones.
  - i. There are 3 zones
  - ii. Each zone has 3 levels
  - iii. Each zone emphasizes a chemistry concept
- c. Playability
  - i. Avoid gameplay loops
    1. Each zone poses a new environment
    2. Each level poses a different objective
    3. Player upgrades
      - a. New equipment and game mechanics
        - i. New cluster buster game mechanic
        - ii. Cluster Buster and Tractor Beam upgrades
      - b. Player stat upgrades
        - i. Purchased using in game currency
        - ii. Speed - how fast the player can move
        - iii. Durability - how many crashes the user can sustain
        - iv. Handling - increased player braking/control
    4. In-game currency for player upgrades
      - a. The player's score in a level becomes available currency
    5. Hidden collectibles for the player to discover
  - ii. Feedback
    1. Provide instant feedback on the completion of each objective
      - a. Large positive feedback text ( great, awesome!, etc.)
        - i. Increases in degree based on success

- b. Audio applause
      - i. any other audio?
  - iii. Risk Reward
    - 1. Player receives more score based on success
    - 2. The player wants more score in order to purchase player upgrades
      - a. why are player upgrades even needed?
  - d. Overall
    - i. Players are expected to play the game in the range of 10 to 60 minutes
      - 1. Levels take 3 min without dying
      - 2. If you die you restart the level and get another 3 min
    - ii. The game will be implemented as a unity web computer game
- 2. Gameplay Design
  - a. Zones
    - i. Transition from cold to hot due to external stimulus
      - 1. story goal produces light? gradually heating environment
    - ii. Show appropriate effect on molecules in each zone
    - iii. Cold Zone (should be easiest)
      - 1. Easiest first zone
      - 2. Molecules move slowly
      - 3. Obstacles don't move much
    - iv. Light Zone
      - 1. Emphasis on light's effect on molecules
      - 2. Obstacles move a bit
    - v. Hot Zone
      - 1. Emphasis on temperatures effect on molecules
      - 2. Obstacles move a lot
      - 3. **Guess: with more heat there's more molecule motion thus should be the hardest zone**
  - b. Levels
    - i. Have a time limit
      - 1. 3 min time limit
    - ii. Environment
      - 1. (This can be changed) Large macromolecules that must be flown around
        - a. Have various different macromolecules
          - i. Give the player direction in terms of which macromolecule they should travel towards
          - ii. User must examine the structure of macromolecules and choose appropriate one
        - b. The bonds of the macromolecule can be flown through
          - i. what is the game effect of being in a bond?
        - c. Atoms are hard and solid
        - d. **Show intermolecule interactions**

- e. **is this enough emphasis on molecule structure?**
  - i. answered via meeting: we don't need this game element

- f. **does scale difference vs collectables make sense?**
  - i. answered via meeting: we don't need this game element

2. Smaller molecules that must be collected

- a. There are degrees of collectable molecules
- b. Ship must be upgraded to collect the larger molecules

c. **which molecules make sense to include?**

- i. Fuels
  - 1. Water
  - 2. Methane and Oxygen
  - 3. Hydrogen
  - 4. Anything with mass
- ii. Solar Panels / Renewable Energy Source?
  - 1. Silicon Dioxide
- iii. Armor/Metal?
  - 1. Iron Chloride:  $\text{FeCl}_2$  or  $\text{FeCl}_3$
  - 2. Reflective: Glass
  - 3. Hard: Diamond
    - a. pure carbon
    - b. can use any carbon containing molecule ( methane, glucose, methanol )
    - c. can also bend light
- iv. Upgrade Molecules?
- v. Molecules that may fit into story
  - 1. Food/Air Related
    - a. Oxygen (  $\text{O}_2$  )
    - b. Carbon Dioxide
    - c. Nitrogen?
    - d. NaCl
  - 2. Acid?
- d. Collectables in general
  - i. They look like the following geometries
    - 1. Linear
    - 2. Trigonal Planar (flat triangle)
    - 3. Tetrahedral
    - 4. Bent-Geometries ( )
    - 5. Pyramidall (tetrahedral with an atom missing)
  - ii. **what do they do?**
    - 1. collectables will move through space
    - 2. collectables will rotate
    - 3. collectables will vibrate

3. Cluster elements that contain many smaller molecules
  - a. Contain the molecules that are needed later
  - b. Present from the start, simply obstacles
  - c. what will these look like?
4. There is a solid boundary that encases game elements
  - a. element bounce around within the game boundary
  - b. element speed within boundary varies depending on zone
  - c. visual representation of boundary changes with zone
  - d. what is the shape of boundary?
  - e. what are the different boundary skins for each zone?

iii. Specific Levels/Tasks/Objectives

1. Collect something for the base fuel
  - a. Zone 1: you are collecting molecules for fuel
  - b. Zone 2: you build solar panels to not have to collect fuel anymore
  - c. Zone 3: oh no the heat destroyed the solar panels, must collect molecules again
2. Collect something to fix the base
  - a. Zone 1: ship is initially damaged and needs certain resources to be fixed
  - b. Zone 2: add armor to the base so it can survive collisions
  - c. Zone 3: repair ship solar panel molecule damage
3. Collect something to upgrade the base
  - a. Zone 1: Acquire Cluster Buster
  - b. Zone 2: Upgrade Tractor Beam
  - c. Zone 3: Upgrade Cluster Buster
4. Objectives order
  - a. Zone 1: collect fuel, fix ship, acquire cluster buster
  - b. Zone 2: add armor, build solar panels, upgrade tractor beam
  - c. Zone 3: collect fuel, fix ship damage, upgrade cluster buster

c. Equipment

i. Tractor Beam

1. Available to the player initially
2. Used to collect molecules, must be aimed at molecule to collect
3. Is upgraded to collect larger molecules

ii. Cluster Buster

1. Used to break up Cluster Elements
2. Must be aimed at cluster element
3. When clusters are broken up, inside elements burst out
  - a. inside element burst speed is a ratio of cluster buster level and the size of the cluster
  - b. small clusters will strong buster will violently explode

- c. large clusters that can barely be broken will slowly disperse molecules
    - 4. Idea: might need upgraded cluster buster for end of game
  - iii. Some other alternative?
- d. Base and Player
  - i. Collectables must be delivered to the base
    - 1. how does this interaction occur?
  - ii. The base will change visually when upgraded/repaired
  - iii. What happens when player collides with the base?
  - iv. What happens when molecules collide with the base?
    - 1. Add force field so the base doesn't have to deal with molecule collisions
  - v. Does this move?
- e. Difficulty
  - i. Levels are lost by not completing the objective in the allotted time
    - 1. how are we showing the player their remaining time?
  - ii. The player can be destroyed by crashing into objects or being hit by other objects
    - 1. When the player hits an object they bounce off
    - 2. The ship's window increasingly cracks
      - a. if the window cracks too much the player loses oxygen and loses
      - b. due to first person, looks like actual screen cracks
  - iii. Instruction
    - 1. Tell player exactly what needs to be done at beginning of level
    - 2. Show the player the molecules they need to collect
    - 3. how will the player know how to use tractor beam etc.
  - iv. Additional adjustable difficulties
    - 1. Density of level?
    - 2. Player durability?
    - 3. Speed of molecules bouncing in environment?

### 3. Technical Details

- a. Single player game
- b. Perspective
  - i. The game is in first perspective
- c. Controls
  - i. Similar to first person shooter
  - ii. Use the mouse to rotate ship look around
    - 1. is there a sensitivity setting/cap?
  - iii. wasd to move
    - 1. w is accelerate up to a top speed
    - 2. s is brake
    - 3. ad are strafe left and right
- d. Can game progress be saved?

- e. The game must export player score and information to an instructor server
- f. **Game resolution?**