

2022 CHEME CUBE DUEL RUBRIC v2.0 (06/2022)



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|--------------------------|--|
| Judge's Name: | |
| Team Affiliation: | |

Duel 1

| Criteria | Outcome | Scoring |
|--|-----------|-----------|
| 1. Product meets or exceeds 6 log reduction of bacterial surrogate | 0 / 1 / 2 | 0, 25, 50 |
| 2. Product meets or exceeds 3 log reduction of oocyst surrogate | Yes / No | 0 / 50 |
| 3. Product meets turbidity specifications (≤ 5 NTU) | 0 / 1 / 2 | 0, 25, 50 |
| 4. Product average flowrate meets or exceeds specifications (≥ 18 mL/min) | 0 / 1 / 2 | 0, 25, 50 |
| 5. Product is within specified pH range (7 ± 0.5) | 0 / 1 / 2 | 0, 10, 25 |
| 6. Product chemical disinfectant concentration acceptable HOCl, OCl ⁻ , Cl ₂ (dissolved), and/or chloramines (total Cl): ≤ 4.0 mg/L ClO ₂ or chlorine dioxide: ≤ 0.8 mg/L Cl ⁻ or chloride: ≤ 250 mg/L | Yes / No | 0 / 25 |
| 7. Fills required volume of product before competitor in "The Duel" | Yes / No | 0 / 25 |
| 8. Weighs less than its competitor in "The Duel" | Yes / No | 0 / 10 |
| 9. Consumes the least amount of electricity in "The Duel" | Yes / No | 0 / 15 |
| SUB-TOTAL | | /300 |
| Competitor: | | |
| Comments: | | |

Scoring Guidelines:

| 0 | 1 | 2 |
|--|-----------------------------------|---------------------------------|
| log reduction < 5 | $5 \leq \text{log reduction} < 6$ | log reduction ≥ 6 |
| NTU > 10 | $5 < \text{NTU} \leq 10$ | NTU ≤ 5 |
| mL/min <12 OR >40 | $12 \leq \text{mL/min} < 18$ | $18 \leq \text{mL/min} \leq 40$ |
| pH out of range | pH range 7 ± 1 | pH range 7 ± 0.5 |
| <i>Chlorine threshold guideline is dependent on chlorination method. See problem statement for more information. Note: If teams select a chemical disinfectant other than chlorine, the teams must provide the judges a fast, inexpensive test kit for use during the competition. The test kit should be described in the EDP</i> | | |
| TOTAL | | |
| | | /600 |

Duel 2

| Criteria | Outcome | Scoring |
|--|-----------|-----------|
| 1. Product meets or exceeds 6 log reduction of bacterial surrogate | 0 / 1 / 2 | 0, 25, 50 |
| 2. Product meets or exceeds 3 log reduction of oocyst surrogate | Yes / No | 0 / 50 |
| 3. Product meets turbidity specifications (≤ 5 NTU) | 0 / 1 / 2 | 0, 25, 50 |
| 4. Product average flowrate meets or exceeds specifications (≥ 18 mL/min) | 0 / 1 / 2 | 0, 25, 50 |
| 5. Product is within specified pH range (7 ± 0.5) | 0 / 1 / 2 | 0, 10, 25 |
| 6. Product chemical disinfectant concentration acceptable HOCl, OCl ⁻ , Cl ₂ (dissolved), and/or chloramines (total Cl): ≤ 4.0 mg/L ClO ₂ or chlorine dioxide: ≤ 0.8 mg/L Cl ⁻ or chloride: ≤ 250 mg/L | Yes / No | 0 / 25 |
| 7. Fills required volume of product before competitor in "The Duel" | Yes / No | 0 / 25 |
| 8. Weighs less than its competitor in "The Duel" | Yes / No | 0 / 10 |
| 9. Consumes the least amount of electricity in "The Duel" | Yes / No | 0 / 15 |
| SUB-TOTAL | | /300 |
| Competitor: | | |
| Comments: | | |