

IITGN Chem-e-Car Competition Rulebook

Team Formation:

- Team size can be 2-5 undergraduate students.
- Each team should consist of **maximum five members**, with **at least two** members majoring in Chemical Engineering.
- One team is allowed to present only one model.

Rules for construction of Chem-e-Car:

- An objective of this contest is for students to demonstrate the ability to control a chemical reaction.
- The model (Chem-e-Car) should comfortably fit into a box of dimensions **40cm*30cm*30cm**.
- Vehicle Drive System: The only energy source for the propulsion of the car should be based upon Chemical Reaction.
 - Use of chemicals **beyond 1-MSDS rating** is **not** allowed.
This includes i) **flammable chemicals** like dynamite, fireworks, mercuric chloride, white phosphorous and nitro-glycerine, etc. ii) **strong concentrated acids** like concentrated Sulphuric Acid, Nitric Acid, Hydrofluoric acid, etc. iii) **Poisonous gases** like hydrogen cyanide, fluorine and chlorine, etc.
- Vehicle Stopping Mechanism: Mechanical Brakes **are allowed** for stopping car (i.e. Mechanical force can be applied to stop or retard the car). But, use of Chemical Reaction to stop the car will **fetch extra points**.
- **Commercial batteries**: No commercial batteries of any kind (for example, AA batteries) are allowed as the power source. Commercial batteries are allowed for specialized instrumentation (e.g. detectors, sensors).

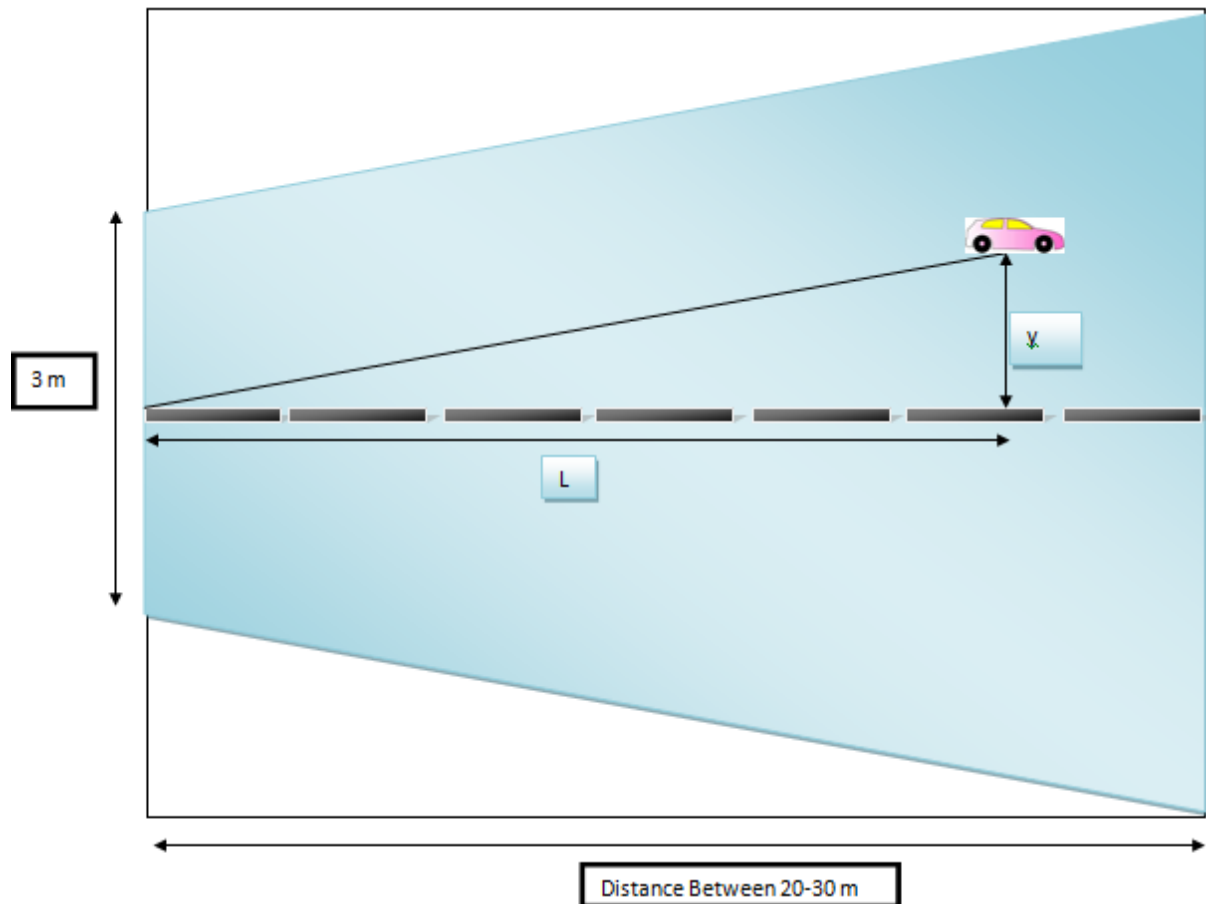
Chem-E-Car Competition Performance Session Rules:

- Each car will be given **two opportunities** to traverse a specified distance carrying a specified load of water.
- The **required load and distance will be given to each team one hour prior** to the start of the performance competition. The **distance** will be **between 20 and 30 m \pm 0.005 m**, and the **load** will be **between 0 and 500 ml** of water.
- Teams may not add or remove any "load" (or other inert items) to adjust the weight of their vehicle once the inspection session has concluded. Teams are only allowed to adjust "fuel" or chemical reactants used in the car's chemical reaction.

Judging Criteria:

- **Performance of the model** on the event day (Weightage-**70%**)
- **Viva taken by the judges** on the basis of the model on event day (Weightage-**30%**)

Course Layout :



- As shown is above figure, track is of **horizontal trapezium** (marked in **light blue colour**).
- The car will start with its front end just touching the designated starting line, with the goal of keeping the car in bounds to a designated finish line. The performance is determined by the distance from the front-most point of the car to the finish line, whether or not the car stops before or after the finish line.
- A **vehicle that goes out of bounds** will have its performance measured by the distance from where it went out of bounds to the finish line, and a **distance travelled will be reduced by 50%**.
- “**Out of bounds**” is defined as having the entire vehicle traverse outside the taped boundaries of the course. The **tape is considered a part of the course**.
- If the **car starts going backwards at the starting line**, the score will count as **0m travelled**.

Performance of the model (out of 70 points):

Let **L** denote the **Central length** which is the distance travelled by the car along the central line, that is, the component of the length traversed along the central line.

Let **y** denote the **Deflection of the car** from the central line, in either direction **perpendicular** to the central line.

Let the **Effective length** be defined as the difference between the Central Length and the Deflection of the car. Mathematically,

$$\begin{aligned} \text{Effective Length} &= \text{Central length} - \text{Deflection of the Car} \\ \text{Effective Length} &= L - y \end{aligned}$$

And let the **Ideal Length for a region (L')** (will be given 1 hour prior to performance) be defined as the length of the central line in that region.

To calculate final score for car performance round, following formula will be used: (Out of 70)

$$\text{Score} = \frac{\text{Effective length}}{\text{Ideal length}} * 70$$