



CHEM-E-CAR

INTRODUCTION

A Test of Design & Creativity as well as Safety features and Future uses of the propulsion system ranging from steam engines to galvanic cells to fuel cell as the basis. The event calls for a balance between speed and direction.

Content

1. The Contest Theme
2. Outline of the contest
3. Presentation
4. Performance Competition
 - 4.1. Load and Distance Specification
 - 4.2. Course Layout and Arena
 - 4.3. General Restrictions on Vehicle Drive System
 - 4.4. Water Load Container
5. Structure of tournament
6. Game Procedure
7. Retries of Vehicles
8. Deciding the Winner
9. Cautions in Vehicle Design and Development
10. Violations and Disqualification
11. General Rules
12. Safety Issues of Vehicles
13. Registration
14. Contacts





1. THE CONTEST THEME

The goal of the contest is development of a chemically powered vehicle capable of performing specific tasks in safest, fastest and most efficient way possible. This vehicle must be designed to also carry a specified cargo. The distance that the car must travel and the specified cargo that the vehicle will carry will be told at the time of the competition. Use of chemical reaction to power a vehicle is a regular research today. But, we at **CHEM E CAR** are looking for some of the best designs that can overcome the daunting challenges faced by engineers in their search for alternative source of power.

2. OUTLINE OF THE CONTEST

The competition event consists of two components:

a) Performance Competition

In this competition, the teams “race” their cars in solo heats, with the goal of having cars travel a precise distance, with a specified load, in minimum possible time. The exact distance will be announced shortly before the competition.

b) Presentation

The presentation must illustrate the construction and chemical reaction involved in each car’s overall design, and demonstrates necessary safety considerations and compliance with competition rules.

3. PRESENTATION Round

a) This presentation should describe how the car is powered using the chemical reaction, the unique features of the car, and environmental and safety features in the design. Entries will also be judged on creativity in the propulsion system and the appearance of the vehicle.

b) The **PRESENTATION Round** and judging will occur prior to the **CHEM E CAR** performance competition. Team members should be present during judging to answer questions from the judges.

c) A team must achieve a minimum score of 60% in the **PRESENTATION Round** to advance to the **CHEM E CAR** performance competition. Presentation will be judged according to the following criteria:

- Description of the chemical reaction / power source (30%)
- Design creativity and unique features of the vehicle (30%)
- Environmental and safety features (40%)

4. PERFORMANCE COMPETITION

4.1. Load and Distance:





Each car will be given two opportunities to traverse a specified distance carrying a certain additional load. 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 8 and 15 m and the load will be between 0 and 500 ml of water.**

4.2. Course Layout and Distance Measurement

The car will start with its front end just touching the designated starting line. There will be a designated finish line. The distance will be measured with respect to the front most point of the car. The goal of the competition is to have your car cross the specified finish line (in bounds), in minimum possible time while carrying the specified load. The course should be wedge-shaped with a starting line and the prescribed distance clearly marked in an arc of constant distance from the starting point. The physical site will dictate the exact course layout. A vehicle that goes outside the course will have its distance measured to where it went out of bounds. "Outside the course" is defined as having the entire vehicle outside the side tape boundaries of the course. The tape is considered as part of the course. When measuring the distance from the finish line it does not matter if the car goes longer or shorter than the prescribed distance.

4.3. General restrictions on vehicle drive system

An objective of this contest is a demonstration of the ability to control a chemical reaction. The only energy source for the propulsion of the car is a chemical reaction. Vehicles entered into the competition must have a significant and demonstrable student design component, particularly with respect to the vehicle drive system, and the starting and stopping mechanisms (if any). Both the chemical reaction driving the vehicle and the start/stop mechanism (if there is one) must be physically on the vehicle during the competition (i.e., preloading of a drive system such as a capacitor assembly is not allowed). The vehicle must be powered by controlling a chemical reaction. **Any vehicle that is purchased from a vendor without major modifications to its operation will be disqualified.**

Commercial batteries: No commercial batteries (for example, AA batteries) are allowed as the power source. Commercial batteries are allowed for specialized instrumentation (e.g. detectors, sensors).

Autonomous vehicle: The car must be an autonomous vehicle and cannot be controlled remotely. Pushing to start the vehicle or using a mechanical starting device is not allowed. Internal combustion engines that use an alternative fuel (e.g., biodiesel, ethanol, etc.) are allowed. The fuel **MUST** be completely synthesized by the students (no additive blending is allowed). Also, the vehicle must not emit any smoke or cause air pollution. Succinct safety procedures for the maintenance and operation of this engine must be demonstrated by the team with considerations to indoor operation. **(Before using an engine, kindly mail and enquire about the fuel you are planning to use.)**

4.4. Water Load Container

The car must carry a container that holds up to 500 ml of water without spilling. At the competition, the container will be supplied, **thus each car must already have the slot for placing the container.** The dimensions of the container are:





Shape: Cylinder

Diameter: 12cm

Height: 8cm

However, the teams can bring their own containers provided it satisfies the dimension constraints. Dimensions less than specified dimensions can be also be used.

5. STRUCTURE OF TOURNAMENT

(i) All the willing participants are required to send an abstract at chemecar@cognizance.org.in before **25th February, 2014**. Best 50 teams will be given a chance to compete in the event.

(ii) The performance round will be held for top 32 teams as decided through presentation round.

(iii) In case of tie at presentation round, points earned in the following sequence will be considered:-

a) Description of the chemical reaction / power source (30%)

b) Design creativity and unique features of the vehicle (30%)

c) Environmental and safety features (40%)

(iv) And if it is still a tie, then the result of their performance round will be taken into account.

(v) The team which traverses the entire distance in shortest time span will be declared winner.

(vi) The match may be stopped in between if the referees judge that continuation of the match is impossible.

6. GAME PROCEDURE:

Race Logistics:

(i) Each car will have four (4) attempts to complete the course in less than three (3) minutes.

(ii) The best score of these four attempts will be used in the judging.

(iii) In the event a team fails to show up on the starting line, or the vehicle fails to start, the next team in the order of the competition will be announced and requested to proceed to the starting line.

(iv) The order of the teams in the performance round of competition will be determined by presentation round beginning with the team that scores least points and ending with the team that scores maximum point.

a) Length of a game:

(i) Each team will be given three minutes at most.

(ii) In any of the following cases, the match ends immediately (even before three minutes).





- a) When the vehicle traverses the complete path
- b) Disqualification is announced in the game.
- c) When the referee judges that the game cannot continue.

b) Setting of vehicles:

- (i) Two minutes are given for setting of vehicles before the game starts.
- (ii) At most four members of each team can engage in setting of vehicles.
- (iii) Any teams that fail to complete setting of the vehicle within two minutes can resume the setting again once the game starts.

c) Deployment of the vehicle and team members at the start of the game:

- (i) The vehicle must be started in the Start Zone.
- (ii) After starting the vehicle, the team members who perform the starting action must not touch it again w/o permission of referee.

d) Starting Procedure:

- (i) Each car is guaranteed a maximum competition time of three (3) minutes.
- (ii) The car must start moving, traverse the distance, and come to a stop within this time interval.
- (iii) If the car goes out of bounds, the team can take a retry.
- (iv) However, during a retry the vehicle must be brought back to the starting line.

e) Game Result

The game result is announced at the end of the 3 minutes, after the referee checks and confirms the completed tasks.

7. RETRIES OF VEHICLES:

- (i) A retry can be made only after the referee permission. Team members are allowed to touch the vehicle while preparing for a retry.
- (ii) Retries of a vehicle can be maximum 4 times within the 3 minutes of vehicle run.
- (iii) During a retry, the vehicle has to be brought back to the start zone.
- (iv) Before a retry, the distance traversed by the vehicle in the previous attempt will be noted down.

8. DECIDING THE WINNER:





(i) The team that takes minimum time to cover the entire length of path is declared the winner. In case, no team is able to cover the entire path; the team that traverses maximum distance is declared winner.

(ii) However, for a team to be considered as winner:-

a) It must have secured at least 60% of marks in the presentation round.

b) It must not have spilled more than 100 ml of water during its entire run.

9. CAUTIONS IN VEHICLE DESIGN AND DEVELOPMENT

(i) All components of the car must fit into a shoebox of dimensions no larger than 40 cm x 30 cm x 30 cm. The car may be disassembled to meet this requirement. If the judges are uncertain whether the car will fit inside the box when disassembled, they may request that the team demonstrate that they can do this.

(ii) During the game the vehicle is allowed to expand its parts provided it does not damage the arena in any way.

(iii) In case of electric power supply, the voltage at any point must be lower or equal to 24V DC during the game.

(iv) Any eliminator, adaptor, etc required will have to be arranged by participants themselves. **No special demands will be entertained.**

(v) The vehicle must not be controlled by wired/wireless remote control mechanism at any stage of the game. The vehicle must operate autonomously.

(vi) The vehicle should not leave spare parts in the arena at any stage. This can lead to a time penalty or may even lead to disqualification.

10. VIOLATION AND DISQUALIFICATION

(i) **No team is allowed to hinder the functioning of vehicles of other participating teams. Failing to do so will straight away lead to disqualification.**

(ii) **No team is allowed to touch directly or indirectly the vehicles of other participating teams. Failing to do so will straight away lead to disqualification.**

(iii) During the match, the team members are not allowed to touch the machine or the arena without permission of referee. They can do so only during a retry. Failure to do so will lead to disqualification.

(iv) Any kind of damage to the venue will attract disqualification.

(v) The teams will be asked to get ready 15 minutes before the start of their match.

(vi) Judges have the right to disqualify any team if they feel the team is not playing with fair interests.





11. GENERAL RULES

- (i) All the students enrolled in high school, undergraduate, postgraduate (excluding PhD.) program at any recognized institute (identity card will be checked) are eligible to participate.
- (ii) A team can consist of a maximum of **4 members**.
- (iii) Each team must declare a name for their vehicle at the time of competition.
- (iv) The vehicles you build will be first checked for size and safety.
- (v) The machine must not contain any dangerous materials for safety reasons. No explosive compression or decompression, either internal or external is permitted.
- (vi) Judges have the right to disqualify any vehicle whose working mechanism or game strategy is considered hazardous in any way.
- (vii) In case any kind of dispute arises **the judges' decision will be considered final and binding to all and no argument** will be entertained.

ABSTRACT SUBMISSION PROCEDURE

- 1) Participants are needed to send in the abstract of the original/review work including the references, the idea proposed with figures (if needed) to following email chemecar@cognizance.org.in. It should present your perspective as well as address all the issues pertaining to the problem statement.
- 2) Abstract **should not exceed 500 words** and the covering page of the abstract must have:
Name(s), Institution of study, Email address(s), Contact number(s) and Cogni-ids of all the team members.
- 3) Your email should have the event and team name as your subject.
For Example, A mail should have subject as: "Chem-e-Car: Team "name" COG14/XXXXX" and file title as: "Abstract by Team "name"".
- 4) Selection to the next round for final presentations will be based on the abstract submitted.
- 5) **Deadline for Abstract Submissions is 25th February, 2014.**
- 6) The result for the first round will be put up on the website till 1st March, 2014 and will also be mailed to you.
- 7) For any particular queries regarding the presentations, please contact the event coordinators.

12. SAFETY ISSUES OF THE VEHICLES





- (i) All vehicles must be designed and manufactured as to pose no danger of any kinds to any persons in the venue.
- (ii) All vehicles must be designed and manufactured as to cause no damage to any vehicles of the other teams or the Arena field.

REGISTRATION PROCEDURE

The registration shall be done through the Cognizance website.

Steps

1. Each Member needs to register on the website. This will generate a unique **Cogni id**, after email verification.
2. The **Team Leader** (which you will select yourself) needs to login into the website through his username and password.
3. The 'Aurora' event, **under the Cognizance** page, has the tab 'Register' to register the team for the event.
4. Enter the **Cogni id** of team leader and other members of the team.
5. This will generate your Team Id and a mail shall be sent to the mail id of team leader about the registration.

Submit your entries and mail your queries to chemecar@cognizance.org.in.

Event Coordinators:

Himanshu Agrawal: +91-8755065915

Saurav Garg: +91-8267038963

