

DMRSEF Frequently Asked Questions

Lin Browning, MA
Molly Nepokroeff, PhD
Fair Co-Directors

About the DMRSEF

- 55th Annual Denver Metro Regional Science & Engineering Fair
- Serve eight counties in Denver metropolitan area: Adams, Arapahoe, Broomfield, Clear Creek, Denver, Douglas, Jefferson, and Summit



About the DMRSEF

- The Denver Metro Region is one of Colorado's 13 International Science and Engineering Fair Regions in the state that feed to the Colorado State Science Fair.

2017 Awards

- **Senior Best in Show:**
 - First Place = \$750
 - Second Place = \$500
 - Third Place = \$250
- **Junior Best in Show:**
 - First Place = \$500
 - Second Place = \$250
 - Third Place = \$125
- **Special awards:** provided by sponsors of the fair.

2018 Categories

- Animal Sciences (AS)
- Behavioral Science (BS)
- Biological Sciences -Biochemistry & Cellular and Molecular Biology (BIO)
- Engineering- Biomedical, Environmental Engineering & Engineering Mechanics (ENG)
- Chemistry (CH)
- Computer Sciences -Computational Biology, Bioinformatics, Embedded Systems, Mathematics, Robotics, Intelligent Machines & Systems Software (CMP)

2018 Categories

- Earth and Environmental Sciences (EV)
- Energy- Chemical, Physical (EGY)
- Materials Science (MS)
- Medicine & Health Science -Biomedical, Health & Translational Medical Science (MED)
- Microbiology (MI)
- Physics and Astronomy (PA)
- Plant Sciences (PS)
- Social Sciences (SS)

2018 Deadlines

- Online registration opens Nov. 30, 2017.

- Last day to register is January 17, 2018.

NO EXCEPTIONS

- Paperwork corrections due February 2, 2018.

2018 Tentative Schedule

- **Friday, February 16, 2018: Day of the Fair**

Registration	8:30-9:30 a.m.
Display & Safety/Photos	9:30-11:30 a.m.
Tours/Activities/Lunch	11:30 a.m.-1:00 p.m.
Judges Preview without students	Noon-1:00 p.m.
Interviews with Judges	1:00-5:00 p.m.
Students dismissed with projects	5:00 p.m.

- **Sunday, February 18, 2018: Awards**

Ceremony	6:30-8:30PM
----------	-------------

Display and Safety

Zach Richards

Display and Safety Chair

Display and Safety

- No food (candy included), no water, nothing that contains chemicals in vials
- No syringes, knives, or ammunition
- No mechanical devices that have pinch points
- No animals or animal parts
- No glass
- No plants, no dirt, no rocks

Information on Judging

Meredith Tennis, PhD

Category Judges Chair

JoJo Law

Special Awards Judges Chair

Judging

- Over 200 volunteer category judges are recruited from academic institutions, industry, retired professionals, and interested community members
- Category judging is based on a 100 point rubric from the INTEL ISEF
- Rubric can be found at

<https://student.societyforscience.org/judging-criteria-intel-isef>

Judging

- Special awards judges are recruited to judge for specific awards based on criteria from award sponsors
- Judging goals:
 - Identify category places, best in fair, and special awards
 - Give some feedback to each student for future presentations or revision
 - Provide positive interactions with scientists for students

Common Paperwork Errors

Jennifer Hellier, PhD

Jesse Hinckley, MD, PhD

Scientific Review Committee Co-Chairs

Adult Roles

- Adult Sponsor
- Qualified Scientist
- Designated Supervisor
- Institutional Review Board (IRB)
- Scientific Review Committee (SRC)

Incomplete Paperwork & Common Errors

- Check boxes NOT marked on forms
- Required forms missing (particularly Form 3)
 - Each project should have a Form 3 to identify potential risks and how they will be reduced
 - Form 3: N/A only allowed on Question 4
- BSL2 work in BSL1 lab setting

Incomplete Paperwork & Common Errors

- Research Plan: Procedures not complete or missing information to understand how the experiment was completed
- Dates on forms are incorrect:
 - Must be dated PRIOR to experimentation
- Copies not clear or easy to read

Please **WATCH** our videos about how
to fill-out and complete paperwork

<http://denversciencefair.com/forms/>

Summary of Changes

- IRB Committee:
 - Added PharmD to the list of medical professionals allowed on IRB (pages 1-8)
- Human Participants:
 - Modified the rules related to the expedited review process (pages 9-10)
 - All human projects are considered to have some level of risk (page 11)

Summary of Changes

- Vertebrate Animals
 - Clarification of required IACUC documentation (page 12)
 - Clarification of toxic studies (page 13)
- PHBAs
 - Clarification about Genome editing (page 16)
 - Clarification about non-native species (page 16)

Summary of Changes

- Form 1 (page 29)
 - Formatting changes mostly to increase awareness of fact that testing inventions, etc. most likely will require a completed Form 4 (Human Subjects).

Summary of Changes

- Research Plan (page 31)
 - All projects must have a Research Plan and/or Project Summary
 - Clarifications of when Research Plan, Addendums, and/or Project Summary are required.

Summary of Changes

- Form 6A (page 40)
 - Signature Sections
 - Dates required for QS and SRC signatures

Human Subjects

- Exempt Projects/Studies: **READ CAREFULLY!**
No IRB Review, no Form 4
- Expedited Review Projects/Studies
 - IRB Review by one adult, Form 4 with correct boxes checked, dated PRIOR to experimentation
- Full IRB Review Projects/Studies
 - IRB Review by at least 3 adults, Form 4 with correct boxes checked, dated PRIOR to experimentation

Human Subjects: Exempt Projects

1. Student-designed Invention, Prototype, Computer Applications or Engineering/Design project **when no health/safety hazard & the student researcher is the only human testing the invention.** → Form 3 is required.
2. Data/record review studies (publically available data)
3. Behavioral Observations in public setting
4. Pre-existing, de-identified/anonymous data set

Human Subjects: Expedited Review

1. The IRB member reviewing the project will determine whether appropriate safety precautions will be employed and whether the project meets criteria for expedited review.
2. If a project submitted for expedited review does not meet the specified criteria, the project must undergo full IRB review.
3. The IRB member reviewing the project **must** have the **expertise necessary** to make such a decision and/or receive advisement from an appropriate expert.

Human Subjects: Expedited Review

If in doubt or confused about Expedited Review.....

Use FULL IRB (3 Member) REVIEW!

Vertebrate Animals: Clarification

- 2017 Wording:
 - Documentation is required of the IACUC approval for the original animal study from which tissue are obtained.
- 2018 Wording
 - Use of tissues obtained from research conducted at a Regulated Research Institution requires a copy of an IACUC certification with the name of the research institution, the title of the study, the IACUC approval number, and the date of IACUC approval.

Vertebrate Animals: Clarification

- 2017 Wording 10.a.
 - Induced toxicity studies with known toxic substances that could cause pain, distress or death, including but not limited to alcohol, acid rain, pesticides, or heavy metals.
- 2018 Wording 10.a.
 - Induced toxicity studies with known toxic substances that could cause pain, distress or death, including but not limited to alcohol, acid rain, pesticides, or heavy metals **or studies with the intent to study toxic effects of a substance on a vertebrate animal.**

Vertebrate Animals: Clarification

- 2017 Wording A.5. (page 13):
 - The final disposition of the animals must be described on Vertebrate Animal Form 5A.
- 2018 Wording A.5. (page 13):
 - The final disposition of the animals must be **conducted in a responsible and ethical manner**, and must be described on Vertebrate Animal Form 5A.

PHBA: Clarification

- 2017 Wording B.4. (page 16)
 - All rDNA technology studies involving BSL-2 organisms and/or BSL-2 host vector systems must be conducted in a Regulated Research Institution and approved by the IBC prior to experimentation.
- 2018 Wording B.5. (page 16)
 - **Genome editing studies** with possible biological impact including alteration of germline cells (insertion of gene drives, use rapid trait development systems (RTDS®) **should be categorized as a BSL-2 study and must be conducted at an RRI** and approved by the IBC from the institution.

PHBA: Clarification

- 2018 Wording B.6. (page 16)
 - Introduction or disposal of non-native, genetically-altered, and/or invasive species (e.g. insects, plants, invertebrates, vertebrates), pathogens, toxic chemicals or foreign substances into the environment is prohibited. Students and adult sponsors should reference their local, state and national regulations and quarantine lists.

Research Plan

- Read page 31:
- All projects must have a Research Plan and/or Project Summary
 - Written prior to experimentation detailing research question(s), methodology, and risk assessment.
 - Addendums required if changes are made during the research. Any additional approvals must be obtained and documented. This document can serve as Project Summary.
- If no changes are made from the original research plan, no project summary is required.

Research plan

Many people in the Archery society debate constantly about which bow is more accurate and consistent; the Compound, Recurve, or Long bow. With my research and my hypothesis, that the Compound bow will be the most accurate and consistent, I hope to shed a light in the debate for the Compound Bow. I am using a professional Bowhunter that has used this variety of different bows in his hunting career.

To conduct my experiment, we will travel to Barr Lake in Brighton Colorado where we will use their Archery Range. We will be shooting at 10 and 20 yards with three identical, carbon arrows and the Compound, Recurve, and Long Bows. We will shoot for consistency by doing the same thing every time then measuring the distance between the farthest left and right arrow. We will also shoot for accuracy by aiming at the same point in the target every time then measuring the group for each bow. As always, safety first.....That is why we have the guidance of a Professional Bowhunter, a qualified archery range, and using common sense for safety.

My sources: Jim Titchenell, www.BowhuntersParadise.com,
www.Bowtecharchery.com, Colorado Bowhunters Association, Gamelines Archery club, Muzzy Archery

Potential
SRC
Interview

Question: If we use the solvent extraction method with Decanoic acid in different ratios of water to simulated saltwater, will we be able to desalinate water at an effective rate?

Ratios (Acid to water): 25:1 20:1 15:1 10: 5:1 1:1

Hypothesis: If we use the solvent extraction method with Decanoic Acid to remove salt from water, then we will find that the Decanoic acid at the 20:1 and 15:1 ratios will work because those ratios are the closest to the original test.

Materials:

- 1 litre >98% Decanoic Acid
- 1 litre of distilled water
- 35g of table salt
- Hot plate with magnetic stirring capabilities
- 100mL Beaker
- 100mL Separation Funnel
- Electric Meter

Procedures

- Mix 1L of water with 35g of salt. Stir until fully dissolved.
- Take 2mL of the solution and mix with 50 mL of Decanoic acid in the 100 mL beaker. Put onto a hot plate and heat to 70°C with continual stirring for 1 hour.
- After stirring is finished, turn the heat off and remove from hot plate. Let it cool and gravitationally separate. Using the glass pipet, carefully remove the transparent liquid from the solution.
- Add the liquid into a small graduated cylinder. Use the electric meter to record the electrical resistance of the liquid. Record Data.
- Repeat step 3-5 9 more times, then another 10 for each of the given ratios until the test stops to work. From that point, test each ratio 1 part of acid up until the ratio with the highest efficiency is found.
- Observe and record data.
- Make a conclusion based on data and observations.

Safety Precautions

Take great care with the Decanoic acid solutions because they are corrosive and hazardous. The Decanoic acid is flammable. Nitrile gloves will be worn and an experienced chemist will be over watching.

Hot plates provide a hazard because of their hot temperatures in this experiment for an extended period of time. Great care will be taken to avoid making direct contact with a hot plate and there will be an experienced supervisor over watching.

Bibliography

- 1 "Solvent Extraction" *Britannica School*. N.p., n.d., Web., 08 Oct 2014
- 2 Bajpayee Anurag, Tengei Luo, Andrew J. Muto, and Gang Chen. "Very Low Temperature Membrane Free Desalination by Directional Solvent Extraction." *Supplementary Material (ESI) for Energy & Environmental Science (2011)*: n. pag
Print <http://www.rsc.org/suppdata/ee/c1/c1ee01027a/c1ee01027a.pdf>
- 3 "Capric Acid." *Wikipedia*. Wikimedia Foundation, 10 July 2014. Web. 08 Oct. 2014.
- 4 "Seawater." *Britannica School*. N.p., n.d. Web. 08 Oct. 2014.
- 5 "Taking the Salt out of Water with Oil." *Taking the Salt out of Water with Oil*. N.p., n.d, Web. 08 Oct. 2014 <http://mpc-www.mit.edu/agenda/item/140-taking-the-salt-out-of-water-with-oil>
- 6 Gregory, Michael J. "Organic Chemistry, Biochemistry" *Organic Chemistry*. Clinton Community College, Web. 08 Dec. 2014 <http://faculty.clintoncc.suny.edu/faculty/michael.gregory/files/bio%20101/bio%20101%20lectures/biochemistry/biochemi.htm>



Questions???

