

The Coating Chemist as Expert Witness

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Overview

The consulting chemist may be contacted by a lawyer, insurance company, or coatings company for assistance in legal matters. Typically, the case will deal with the failure of a coating in a specified test or application, or the alleged theft of a coating formulation. In either type, the lawyers, judge, and perhaps a jury will need at least two things from the expert witness: instruction and judgement.

Introduction

The call for a chemist to serve as a technical expert in legal matters is fairly common and the expert must address various questions in the field of polymer and coatings science. The referrals often come from: a coatings or chemical company, who know of the chemical expert from published work or previous work as a consultant; lawyers with whom the expert has worked; legal expert databases (such as ASTM, ACFE, etc.); or referral services (such as Expert Resources near Chicago).

The lengthy lawsuit process involves several distinct stages, including the following:

(1) Gathering evidence that a potential lawsuit might be a remedy for the plaintiff.

(2) Filing the lawsuit, stipulating the harm, and estimating damages resultant therefrom.

(3) Engaging in the "discovery" process involving a gathering of evidence from the other side to determine its validity, and construct arguments against it. This may involve taking deposition(s) of witnesses (participants in the lawsuit or their

technical experts) to find out their qualifications and their opinions.

(4) Preparing final arguments.

(5) Trial.

The expert may be engaged at any point in the process, but the earlier the better for the expert and the case. In the first four stages, the expert is really a consultant to the lawyer and the lawyer's client. Only in the last phase does the expert actually become a witness, since the job of the witness is actual testimony.

Discussion

Upon receiving a call regarding a case, I divide the process into three basic stages: (1) Assessing the science underlying the case to determine if the technical argument has merit, (2) Instructing the lawyer(s) about the science and what it means, and (3) Making the actual deposition/giving testimony.

First, the expert has to examine the evidence for the case to see if the case has merit. In several instances, a paint company or an insurance company for the paint manufacturer contacted me to look at the problem and write a report of my findings. This often calls for a visit to the site of the painted surface and discussion of the paint application with the painter (if available) and the site owner/manager about use or exposure.

My first cases of this sort were as the California troubleshooter for Olympic Stain, a national wood coatings company that was located near Seattle, Washington. In seven cases over about a five-year period, I only found one where a paint had gone bad in the can before application.

Sampling the gummy surface submitted for their analysis showed the drying oil had gelled before it was applied. In all other cases, the application was at fault, or the expectation was too great. The latter case involved a pink acrylic latex coating that had been applied to stucco 17 years earlier. Cracks had appeared, and had been repaired and repainted with the same paint. The colors did not match and the customer complained. I did my best to explain that sun fade in California, especially after 17 years, was to be expected.

The worst case of faulty application was a pigmented oil-based stain applied to siding. The painter had made up short board panels to demonstrate the colors of a variety of stains on wood scraps from construction of the new house. He had rubbed in several coats on each board to make sure of good coverage, however, he had spray painted the siding on the house after the construction was completed. Their complaint was that the siding did not look like the rub-up samples. I described the movement of pigment in rubbing, and the stationary pigment in spraying (after it hits the siding), and that made both owner and painter mad. So much for science on a micro scale.

Many cases end at this point with a simple report to the insurance company or other client. They may decide to pay the claim or otherwise remedy the situation. Some years ago, I was

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called into a condo complex by a homeowners' association to examine a problem of brown paint streaks on an unpigmented stucco. The contractor had sub-contracted to some painters to put a dark brown latex paint on the window/door frames after construction was complete. When the job was finished, and the new homeowners had moved in, several complained that there were "dirty" streaks from some windows (no more than five percent of the windows) that they wanted cleaned up. The contractor could not wash them off and was forced, via legal threat, to find out what was wrong and remedy it. I was called in by the homeowners' association to help the contractor.

Examination showed that the stucco had the dark iron oxide pigment particles embedded within the stucco. The condo complex is located on a San Francisco Bay frontage area, so I asked the contractor's representative when the painters stopped their painting during their work day. It turns out they stopped when the daylight was just about gone. Now, there is an evening fog that comes through the Golden Gate at the very time they stopped. I hypothesized that the last paint application was diluted by the condensing fog, and some pigment had drained off that surface onto the stucco.

My report, along with a small bill for services, went out to them, but it did not end there. They called me back for two things. First, they showed me a report they had commissioned from a local testing lab for several thousand dollars. It said essentially the same thing I did, without the rationale I had proposed. They were analytical chemists with no latex or paint background, so they could not rationalize how it happened. Furthermore, they could not recommend a remedy. The homeowners' second point for me was to come up with a remedy.

First, I suggested a drastic chemical wash that might not dissolve the pigment, but might hurt the surface and the plants beneath on the landscaped ground. The second option was to lightly sandblast (low pressure, soft mineral like talc) to "brush" off the staining. They had never heard of such a thing, but they offered to fund a trial. I bought a small low-pressure sand blaster and a bag of talc. I set up the demonstration to show how easy it would be. I carried in a pound of a standard heavy duty mineral for sandblasting to demonstrate the reason

for using the soft mineral. I cleaned up one wall's stains in a matter of about 15 minutes with the talc at about 40 psi air pressure. I also showed, on a spot hidden by bushes, the sort of damage one could do with the high pressure and hard mineral. The homeowners' association bought the sand blaster and talc from me. Both the construction company and the homeowners' association felt my fees and demonstration were enough to stop the lawsuit, and everyone was happy.

Often, the cause of damage is not so obvious, so some analysis or testing may be needed. In those cases, I call a local testing or analysis laboratory

to help me to determine whether the problem can be demonstrated or rationalized through some analytical technique. I was retained in one case where outdoor wooden furniture coated with an oil-alkyd formulation was failing on outdoor exposure after only a few months of the mid-western sunshine and rain. I was given sample chair seats that were bare of coating, with the statement that the coating company claimed it was not their coating, with analytical results confirming no oil-alkyd was present. Their coating had a unique combination of biocides present (most companies use only one), so detecting the biocide pair was the key. I had a lab look at the screw holes and the glue lines for the biocides, and they found them. The coatings company settled out of court.

When the lawsuit cannot be so quickly resolved, the second stage is to instruct the lawyer in the case about the science involved so we may proceed further with the suit. Here, I have made a judgement that the scientific evidence in the case has merit for the side that retained me. The lawyers know next to nothing of science, in most cases (the exceptions are some patent lawyers who have technical or engineering degrees), so we have to find a common language to describe what a polymer or a paint is in their terms.

The most common descriptions I use for polymer or colloid systems come from cooking. I relate a polymer to a plate of spaghetti, while a plate of

macaroni is related to the monomers. You can pick up the spaghetti from the bowl in your hands somewhat separated, and few if any strings fall out, while attempting to do that with macaroni has it all over the floor. The wet cooked spaghetti behaves as an elastomer (mobility), while drying that spaghetti will make it behave as a plastic. Stapling the wet spaghetti strings makes it act as a crosslinked rubber. Lawyers and juries can envision the parallels on a microscopic basis quite easily. I compare colloidal systems to things they know such as milk, pudding, gelatin, and gravy.

The lawyer, after his instruction, must frame a set of questions to ask in the courtroom, so the judge (and jury, if needed) can get the same training painlessly, but thoroughly enough, to be able to make decisions about the importance to the case argument. Preparing this question outline takes considerable time, as it has to be painstakingly detailed, lucid to all concerned, and framed to point toward the desired decision. This requires skill with language, construction of definitions of terms, and descriptive skills for processes, physical characteristics, what tests are, and what they show. The lawyer also has to prepare the expert for deposition, a part of the pretrial discovery process where the other side learns what your testimony will be and what it is based on in science (analyses, testing, literature, experience, schooling, etc.).

The preparation for a trial may be quite extensive. I remember a case of trade secret theft I helped investigate in 1987, where I was involved in weeks of research through many cubic feet of papers on the topic, a week or two of construction of testimony outlines, two

or three days of deposition before trial, and three and one-half days of testimony in the trial. We were successful as the owner of the trade secret ended up owning the two companies involved in the theft.

The deposition, part of the discovery

process where the other side asks questions of the witness in front of a court reporter (but no judge), usually takes place in a simple conference room. The parties present are the witness with his lawyer(s), the court reporter, and the attorney(s) in opposition. In cases where there are multiple defendants or plaintiffs, each

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may have a separate attorney present to ask questions. An expert for the opponent's attorneys may also appear to observe the deposition, and write potentially useful comments or questions for the opposing attorney.

The first part of the deposition consists of questions on personal history (education, experience germane to the case, other qualifications) and then they move on to the case issues. Questions on the case start with the documents the expert has seen or used, any laboratory testing or analyses done (with interpretations), any witnesses (or potential witnesses) interviewed, and any other items that help the expert form an opinion. The last point is what opinions are being offered. The attorney accompanying the witness may object to the form of questions if they are vague, or not pertinent. I often have a sheet of paper on which I record the spelling of technical terms for the court reporter, as they often have never heard the scientific term before. The deposition record is transcribed by the court reporter from the stenotype record and perhaps a simultaneous audio tape of the proceeding. The record is then sent to the witness for review, so any changes (usually spelling) may be made as needed. This record is used by both sides as final preparation for the trial to make up a script of questions to be asked of the person who gave the deposition. The deposition may also be introduced as evidence in the trial, so the party giving the deposition need not appear at the trial.

In many cases, the trial is the anticlimax for the expert. Indeed, several cases I worked on had the lawyer decide at the last moment that my testimony was not absolutely necessary, so I did not testify. That happened in my first case working for the U.S. Department of Justice defending the General Services Administration who was being sued for too stringent a test limit on color measurement for a certain kind of paint. My discussion of the technical detail for the case with the lawyer and the test lab manager was enough for them to succeed in the case. The specification called for a color match within one unit of Delta E, for which I had surveyed industry experts, finding that already quite lenient. We won the case without my testimony, which means stages 1 and 2 were sufficient.

Treatment of the expert at trial (or deposition) is varied. Most lawyers for the other side are quite formal, dignified, and dispassionate. However, occasionally, an opposing lawyer has

fire in his eye and heart, and the questions will swoop in tone and volume. The key is to look at whom you are testifying to: the judge or jury. Testimony, given dispassionately, with an occasional smile when you score a desired point, helps the judge or jury to empathize with your situation. The lawyer who retained you can object to certain kinds of questions, if they have appropriate grounds, and they know those grounds better than I do. The lawyer I work with will object if I am asked to speculate about something I may not know, especially if it is outside my field of experience, research on the case, or personal knowledge.

Lawyers frequently try to discredit the expert in the trial proceedings. For instance, the lawyer in a trade secret theft case on urethane/asphalt roof coatings, questioned me on the purpose of the carbon black. (I said reinforcement.) He then read from a patent by a rubber company describing the carbon black used as a filler. In redirect (examining one's own witness again) the attorney who engaged me asked for clarification of why the patent used a different term that I did. I explained that was ancient jargon of the rubber industry, as they originally used it as a filler to make it cheap, and discovered to their surprise that it added strength as a reinforcement. The jury smiled and gave us the ruling we wanted.

The treatment of the expert by a judge can be a mystery in logic to the scientist, too. In the aforementioned trade secret theft case, there were five essential ingredients in the formulation, which we presumed could be in use from 0.1% of the formulation to 99.6% (essentially 1000 possible concentration levels). Probability predicts that the formulation could not be reproduced to the third significant figure by chance, but one time in ten to the 15th power times. The judge would not allow that argument, as there is a California Supreme Court ruling prohibiting statistically based predictions. (How do they rationalize toxicology cases, then?)

However, that judge would allow me to discuss the appropriate means of protecting trade secret information (batch cards, raw materials' names, and the like) based on my industrial

experience of such protection in companies where I worked. Yet, several years later in the urethane/asphalt roof coating trade secret case, a different judge let me talk about all manner of public domain knowledge about the formulation in question, and would not let me say a word about my experience of guarding trade secrets or the previous case I had testified in. We won the case anyway.

Some lawsuits do not go to court, but go to an independent arbitrator instead. Here, the proceedings are not as formal as in the courtroom, and the litigants have agreed to abide by whatever the arbitrator rules. Some of these cases can have amusing moments. In one case, regarding a paint

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job on woodwork in a law firm's offices, the opposing lawyer was trying to discredit my judgements as to the quality of the work and the damages or lack thereof. He asked if I was familiar with the standards for wood coating appearance in the small city where the job was located. My reply was that I knew of no standards in any small city or even for the state of California for wood coatings, but that I have been trained by a national wood coating supplier company to be their troubleshooter for the state of California. I could not envision the small city would have any special requirements to supercede that. The arbitrator laughed, and the opposing lawyer lost his case.

Other lawsuits that do not go to court are simply ended by a settlement conference among the lawyers on both sides, sometimes in the presence of a judge. This usually occurs after all the evidence on both sides has been gathered, and each side knows the other side's evidence through the discovery process. In some cases, I am not pleased that the settlement was accepted by my client, in that the evidence to my mind does not support the case. However, this is often dictated

by the insurance company who weighs the cost of a trial (that they may or may not lose) versus a smaller settlement fee now. Commonly, the settlement decision may involve where the trial is to be held, what the composition of the jury may be (if it is to be a jury trial), and other non-scientific factors.

Sometimes, the lawyer for the insurance company or the insurer will call for the help. An insurance company called me because their Los Angeles-based company was facing a color disappearance lawsuit in a multi-million dollar home near San Jose. We arranged a site visit with the homeowner and arrived to find him and two lawyers (representing whom I did not know). I was given the tour, finding the clear walnut stain was as expected in many portions of the wood work within the home, but in the connected rec room, kitchen, and dining room, the wood had turned blonde. The home-

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owner was sure the sunlight had bleached out the dark portion of the walnut stain, as this area was quite open to the sunlight compared to the rooms that were unaffected.

I queried the cleaning that was done and found that no bleach was used. However, they did claim a gentle soap recommended for wood was used, as well as liquid polish. When I examined the labels on the soap and the polish, I noticed a small amount of non-polar solvent was in each. I returned to my office and called the technical director of the paint company to query him on the source of the black used in the walnut stain. It was Gilsonite, a hard bituminous material mined in the western U.S. which I often used as a hardener in hot melt adhesives. It is soluble in hydrocarbons to some degree, so repeated insults with the soap or polish would have extracted it. My report to the insurance company was gratefully received.

In other cases, a construction company will call to find out what the problem is, so they can develop the case for their lawyers. About August of 1987, I was called to the Chuckawalla Desert in southeastern California by an engineering firm that was managing the construction of a prison. This was a really isolated flatland desert about 20 miles from the nearest town on the Arizona border. Temperatures were in the low 100's during the day.

The engineer who guided me to the problem area told me about the new technology being used to build the prison. Concrete slabs were cast flat on the ground on sheets of polyethylene, and after drying and cure, the slabs were tilted up to be the outside wall of the building. The slabs were about 40 cm thick and about 10 to 15 m by 3 to 5 m, and had been cast from January to about April of that year. He gave me a copy of the specifications for painting the interiors, and there were seven different specifications, depending on locations within the prison.

The problem was that one set of paint specifications were failing badly. The large flat expanses of interior walls had the paint coming off in sheets. They had started painting in June and painted all areas as soon as they were erected and enclosed. We

went to one of the walls, and he handed me a putty knife to scrape the paint. I did, and it fell off in a sheet from its own weight! In discussing this with the painter, I found that this was a three-coat system, a vinyl acetate latex primer, an alkyd undercoat in aliphatic solvent, and an alkyd topcoat in a combined aliphatic/oxygenated solvent blend. Reading the specification, I found the primer was supposed to be a solventborne alkyd, but the painter said the supplier had assured him this latex was equivalent in properties to the alkyd.

We took samples of wet paints and the sheets falling off the wall, and carried them off to a lab. IR spectroscopy showed the wall side of the dried coatings contained a mixture of: the expected latex polymer, the undercoat alkyd, and a small amount of the silicone release agent used for casting the concrete in the forms.

My analyst said the problem was the release agent, but I pursued further with calls to obtain more information.

A call to the latex supplier got me confidential information that the coalescent used in that latex was Texanol® (2,2,4 trimethyl pentanediol monoisobutyrate, Eastman), there were no glycols, and coalescent was about five percent based on solids. A call to the construction engineers showed the release agent was applied to all surfaces of the concrete casting, and that none of the other surfaces with release agent had any adhesion problem with the paints used—all solventborne. The temperature in June and July (when the painting was done) was 90°F at night and as high at 115°F during the day, with humidities at 10% maximum during those periods.

My report was simple. Whoever had supplied or purchased the latex was at fault, as the drying was too fast for penetration and coalescence to occur. The undercoat essentially filled in gaps in the not-quite coalesced film, and when the topcoat was applied, the oxygenated “hot” solvent reached through the undercoat and extracted the vinyl acetate away from the surface into the undercoat. The engineering contractors accepted the report as an excellent interpretation of the facts, and the supplier and painting contractor were not pleased at all.

This problem ended up in the courts, and I have no idea how it was resolved. However, I recently was engaged by the California State Attorney General with regard to another matter concerning the prisons and found that the Chuckawalla Desert Prison was successfully completed. They have built the Ironwood Prison next to it since then.

Conclusion

The consulting chemist can find entertaining and remunerative employment as an expert for the law in preparation for the courtroom. The problems presented are interesting and the expert learns a lot from the wide variety of details involved in a case, as well as performing a useful service to the court, the community, and the client.